THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—18TH YEAR. SYDNEY, SATURDAY, SEPTEMBER 5, 1931. No. 10.

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THE TREATMENT OF UTERINE CANCER.[1]

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MY commission to introduce a discussion upon the treatment of uterine cancer requires that the terms of reference should be briefly defined.

The word "cancer," although still found in official notation, is tending to become an all-embracing colloquialism. In accordance with the more precise classification of malignant neoplasia by modern histologists the designation "uterine cancer" may connote one or other of the following varieties: epidermoid carcinoma, adeno-carcinoma, sarcoma, chorion-epithelioma.

In defining the significance of "treatment" we must recognize that the present-day management of these morbid conditions is placed under the following disadvantages: (i) The unknown ætiology of uterine cancer—a feature which compels a speculative prophylaxis limited to the elimination of so-called "precancerous" lesions; (ii) the insidious onset of many uterine cancers—a feature which compels very often the device of palliative measures for hopelessly advanced cases; (iii) the lack of any specific constitutional remedy for uterine cancer—a feature which compels dependence for cure upon purely local therapy (surgical and radiological) prejudiced *ab initio* by stringent anatomical and pathological limitations.

[1] Read at the Second Cancer Conference, Canberra, March 27, 1931.

Thus defined, my task and purpose is to give my own experience of the prophylactic, curative and palliative treatment of the four varieties of malignant neoplasia already mentioned.

Culled from practice in private and at the public hospitals (Alfred and Austin), I have records of 150 patients who have been at some stage or another under my care during the years 1927 to 1930 (inclusive). For the same period the fatal cases for the whole of Victoria numbered just over 500. Corrected to allow for a recovery rate of 20%, this mortality figure represents an approximate incidence of 600 cases in four years. It will be noted, therefore, that I have attended approximately 25% of the Victorian total during the period under review. Including cases prior to 1927 my total is 164.

These figures suggest that for the purpose of treatment there is a tendency for such patients to aggregate in a few large metropolitan centres.

The following summary presents the clinical material classified according to diagnosis, prognosis and treatment.

Of 164 uterine cancers: Chorion-epithelioma, nil; sarcoma, 4; carcinoma, 160.

Of four uterine sarcomata: Cervical, nil; corporeal, 4 (one endometrial, three myometrial).

Of 160 uterine carcinomata: Cervical, 129; corporeal, 31.

Of 164 uterine cancers (three categories, A, B and C):

A, treated primarily (that is, by myself), 79 (3 sarcoma, 76 carcinoma).

B, treated secondarily (that is, by others initially), 65 (1 sarcoma, 64 carcinoma).

C, untreated, 20.

The 79 patients with uterine cancer treated primarily (category A) are enumerated in Table I.

TABLE I.

Group.		Sarcoma.	Corporeal Carcinoma.	Cervical Carcinoma.
(a) By operation (27):				
Patients alive ..	13	1	6	6
Patients untraced..	—	—	—	—
Patients dead ..	14	—	2	12
(b) By radium (41):				
Patients alive ..	23	1	2	20
Patients untraced..	6	—	1	5
Patients dead ..	12	—	5	7
c) By radium and operation (11):				
Patients alive ..	6	1	3	2
Patients untraced..	0	—	—	—
Patients	5	—	2	3
TOTALS		3	21[1]	55[1]

[1] These cases are analyzed more fully in subsequent tables.

The 65 patients with uterine cancer treated secondarily (category B) are enumerated in Table II.

The 20 patients with uterine cancer who were untreated (category C) are enumerated in Table III.

The chief reason why such a relatively large proportion of cases is made up of categories B and C is that most come under my care at the Austin Hospital for Chronic and Incurable Diseases, which institution is inevitably the "dumping ground" for patients in the advanced stages and for therapeutic failures. Here one has opportunities of seeing the heinous end results of untreated and inffectively treated uterine cancer, and I not uncommonly reflect how inadequate is our crusade against this dread affliction.

TABLE II.

Group of Patients.		Sarcoma.	Corporeal Carcinoma.	Cervical Carcinoma.
Alive	3	—	—	3
Untraced	6	—	—	6
Dead	56	1	5	50
TOTALS	65	1	5	59

TABLE III.

Group of Patients.		Sarcoma.	Corporeal Carcinoma.	Cervical Carcinoma.
Alive	—	—	—	—
Untraced	2	—	—	2
Dead	18	—	5	13
TOTALS	20	—	5	15

To mitigate the suffering and dispel the despondency of these unfortunates is indeed a problem testing to the utmost the courage and ingenuity of the medical and nursing personnel. Here in the cancer ward one encounters the gruesome horrors of Nature at its ugliest, in marked and sardonic contrast to the glorious and extravagant splendour of the Heidelberg countryside surrounding the hospital with vistas of exquisite beauty.

One soon learns that for these patients any form of major surgery is contraindicated; intravenous lead injection only adds to their suffering. Deep X irradiation appears to possess some merit in postponing the evil day, but occasionally it appears to induce senescence in the space of a day or two. Occasional patients are markedly but only temporarily relieved by palliative radium therapy.

Our mainstays at the Austin Hospital are beautiful surroundings, cheerful and frequently changed nursing staffs, assisted by judicious irradiations, plenty of morphine, water beds and, latterly, the prince of deodorants—the electric "Claritor."

With reference to those cases initially treated by myself (category A), almost all have attended the Alfred Hospital.

The gynæcological department at the Alfred Hospital was created in 1924 (with an initial establishment of six beds and an out-patient clinic meeting two afternoons a week) and from this time onwards the surgical treatment of uterine cancer gradually passed from the hands of the general surgeons to those of the gynæcologist. In 1926 the radium supplies of the hospital were considerably augmented and a radio-therapeutist was appointed.

The organization, however, has permitted the use of the radium by the gynæcologist, so that, with comparatively few exceptions, the radium therapy of uterine cancer has devolved upon him. These developments have placed upon myself, as gynæcologist, the highly responsible obligations of acquiring first of all a reasonable degree of skill in performing the difficult surgical excisions and later of familiarizing myself with the elements of radio-therapy. The available radium is indicated in Table IV.

TABLE IV.

Establishment.	Number.	Type of Applicator.	Active Length in Millimetres.	Screen Equivalent.	Content in Milligrammes of Radium Element.	Total in Milligrammes.
				Millimetres Platinum.		
Alfred Hospital	80	Needles	20	0·5	1	80
" "	20	"	40	0·5	2	40
" "	9	Tubes	20	1·0	5	45
" "	2	"	20	1·0	10	20
Austin Hospital	2	Needles	15	0·5	10	20
" "	2	"	15	0·5	5	10
" "	5	"	15	0·5	2	10
" "	10	"	15	0·5	1	10
Commonwealth[1]	1	Tubes	30	1·0	20	20
"	2	"	10	1·0	10	20
"	2	"	20	1·0	5	10
Private ..	1	"	30	1·0	20	20
" ..	3	"	10	0·5	5	15
" ..	10	Needles	20	0·5	1	10
TOTAL RADIUM ELEMENT IN MILLIGRAMMES						330

[1] Supplies of radon 1·5 millicurie gold "implants" have been recently available on requisition from the Commonwealth Laboratory.

Histological Diagnosis.

A laboratory service has usually been available to assist our clinical findings. In not more than a dozen cases in the series of 164, all clinically certain, is pathological proof missing. A microscopical section supports the diagnosis of every case in which we have been responsible for the initial treatment (category A). Most of this material has been derived from biopsy examinations prior to treatment; the remainder has been collected either at operation or autopsy. Failing histological evidence, I have had to classify as precarcinoma two of my operative successes that might otherwise have figured as cancer cures.

In those cases in the series in which the initial treatment had been conducted elsewhere (category B), although the clinical diagnosis was rarely other than obvious, the microscopical proof was frequently not forthcoming until a *post mortem* opportunity arose.

In the eyes of the statistician the merit of a clinical cure is seriously prejudiced by the absence of microscopical evidence. Clinicians, therefore, who are jealous of their results, do well to be zealous in their biopsies. A lost opportunity for proving cancer rarely recurs in a patient who survives treatment, whereas in the case of a fatal termination the diagnosis is readily established.

Dr. R. A. Willis has been responsible for the bulk of the pathological work, including approximately fifty *post mortem* examinations. It requires but a moment's reflection to appreciate his prodigious industry.

In addition to Dr. Willis, Dr. A. J. Trinca and Dr. John Fiddes reported on quite a number of microscopical slides.

An interesting feature in many instances of cervical biopsy was the use of an endothermic loop in order to obtain the necessary sample of tissue (Figure I).

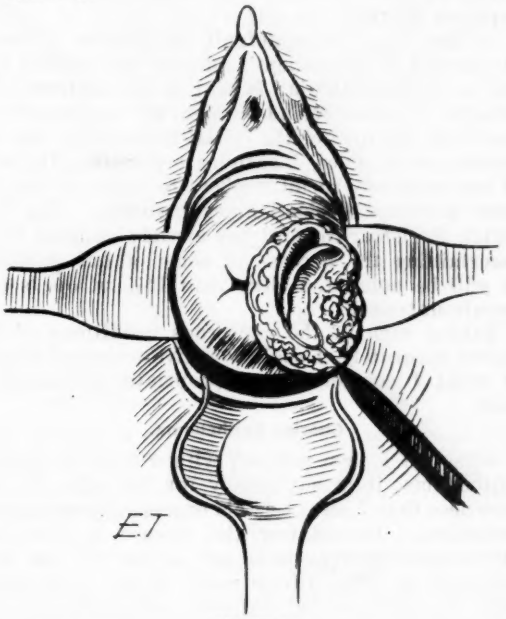

FIGURE I.
Electrothermic-loop biopsy. (From *The Journal of the College of Surgeons of Australasia.*)

The histological findings in 155 cases were as follows: Chorion-epithelioma, 0; sarcoma, 4; adenocarcinoma, 35 (31 corporeal, 4 cervical); epidermoid carcinoma, 116.

Follow-Up Department.

For the welfare of all patients surviving the initial treatment and in order to assess our results, periodical clinical examinations are necessary for as long as five years afterwards. The facility with which cancer patients can be supervised subsequent to their initial treatment is not uncommonly influenced by social status. Classified according to this factor, the 160 uterine carcinomata in my series show the following distribution:

Treated in private practice: Corporeal 13, cervical 12.
Treated at public hospital: Corporeal 18, cervical 117.

It will be noted, therefore, that in the case of the uterine cervix carcinoma appears to be more prevalent in the poorer members of society than it is in the ranks of those who are independent.

At the Alfred Hospital a simple "follow-up" system has been organized in an attempt to insure

these regular reviews. Every clinical record consists of two sections—a card (outdoor) and a loose-leaf folio (indoor). On leaving the indoor department, the patient is given a printed slip warning her to attend the outdoor clinic within three weeks of her discharge. After this first reexamination she is detailed to report at monthly intervals for the first six months, at every trimester for the next twelve months and thereafter every six months. A check on these attendances is obtained by filing the clinical history card in a cabinet reserved for gynæcological cancer records indicating the month of expected return.

In the event of a default, a circular letter is dispatched to the patient's address and, should this fail, a similar circular is sent to the address of a relative or close friend (which we are careful to record at the time of the initial treatment). As the system grows older, I anticipate soliciting the help of our auxiliary social workers to assist in tracing some patients by domiciliary inquiries. The Victorian Registrar-General has already assisted us in ascertaining the decease of some of our patients. It will be noted that less than 10% of our series remain untraced.

Taking each of the cancerous conditions of the uterus separately, I shall now give technical details of what I consider the appropriate treatment of each.

Chorion-Epithelioma.

Although I have not met with a case of chorion-epithelioma, it is not merely for the sake of completeness that I mention this exceedingly malignant condition. Fortunately the disease is rare, but approximately five times out of ten it has been preceded by hydatidiform mole. I have been called upon to treat several patients with moles of this character, and in each instance I have sought for reasons of prophylaxis to empty the uterus thoroughly and to watch assiduously the subsequent progress of each.

If there is aught in Blair Bell's hypothesis that plumbism causes abortion by reason of a selective toxicity of lead for the chorion, then, indeed, is lead chemo-therapy ideally suited for both prophylaxis and cure of chorion-epithelioma. With prophylactic intent it should be administered to all persons who have recently discharged an hydatidiform mole and with curative intent so soon as the presence of chorion-epithelioma can be diagnosed.

Strictly speaking, chorion-epithelioma, though usually classified as such, is not a uterine cancer at all, but is a disease originating in the fœtal envelope. An interesting reflection in this connexion is the fact that when chorion-epithelioma disseminates within the organs of the mother, it represents a transference of malignant neoplasia from one individual to another. We are accustomed to the artificial transference of malignant tumours from one laboratory animal to another of the same species, but as far as I am aware, the above-mentioned example is the only instance of the natural occurrence of this phenomenon.

Sarcoma Uteri.

Instances of *sarcoma uteri* are sufficiently uncommon to preclude the enunciation of a standard treatment. The details of management, modified in accordance with expediency, will be best presented by a citation of the three surviving cases in my own experience.

CASE I: Mrs. E. was seventy years of age when she commenced to suffer with increasingly severe uterine hæmorrhages. Not until after three months (April 30, 1930) did she seek medical aid, whereupon examination revealed a uterus enlarged to double the normal size by a diffuse sarcomatosis of the endometrium, the curette gouging out thick circumflex strips of bacon-like consistency. Intrauterine irradiation for fifty hours with twenty milligrammes of radium in a platinum tube, one millimetre thick, encased in rubber, gave relief for five months. At this time (October 11, 1930) a large polypoid recurrence was noticed, so that a similar but very much larger irradiation was given and further (possibly permanent) relief was obtained.

CASE II: Mrs. R., aged thirty-one years, was exsanguinated by reason of prolonged hæmorrhage from a large sloughing polypoid tumour which so completely filled the vagina that it effectively barred direct access to the thick peduncle occupying the cervical canal.

A large silver wire noose was drawn through a length of quartz-glass tubing (dielectric) and guided with some difficulty over the circumference of the tumour. By pulling on the free ends of the wire with an artery forceps and using the glass tubing as a slip, the noose was tightened round the neck of the tumour (Figure II).

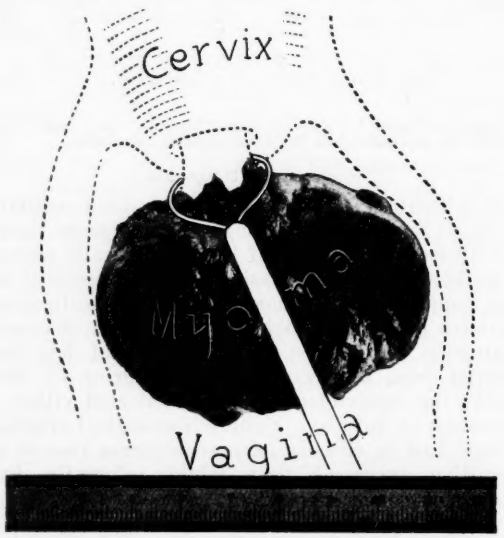

FIGURE II.

Pedunculated myosarcoma filling vagina; removal by electrothermic snare. (From *The Journal of the College of Surgeons of Australasia.*)

The d'Arsonval and Wyeth currents alternately were directed into the snare by live contact of an electrode with the forceps holding the ends of wire outside the vagina. Detachment of the tumour followed in a couple of minutes and the slight hæmorrhage from its base (now readily accessible) was easily stemmed by fairly heavy fulguration. No more than ten cubic centimetres of blood were lost throughout the operation.

After photography the tumour was discarded without microscopy. This omission was a mistake which allowed us to nurture the belief that we had cured the patient by myomectomy.

Actually the tumour must have been a sarcoma, because in eight months' time, after a period of excellent health, she relapsed into further uterine bleeding and abdominal panhysterectomy (December 31, 1930) had to be performed for the removal of a large sarcomatous uterus[1] (Figure XIII).

CASE III: Mrs. J., a parous woman, aged forty-eight years, was an "immediate admission" to hospital from the casualty department on account of an alarming recurrence of the uterine hæmorrhage from which she had suffered off and on for the previous three months.

Tight vaginal tamponade and minor blood transfusion paved the way for active treatment at the end of a week of what was regarded as a cervical fibroid (the size of a fœtal head at term). This tumour occupied the left broad ligament, displacing the uterus to the right. The uterine cavity was twenty centimetres (eight inches) long (Figure III). Conservative surgery being indicated, vaginal enucleation was chosen as being likely to suit the conditions best.

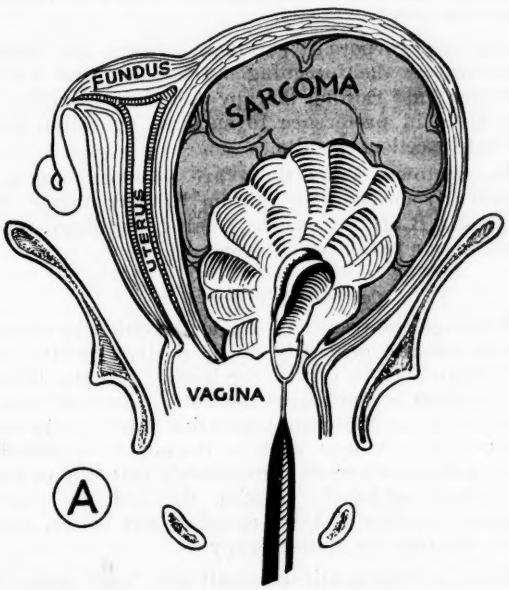

FIGURE III.
Intra-ligamentary myo-sarcoma: electrothermic-loop "*morcellement.*" (From *The Journal of the College of Surgeons of Australasia.*)

With the patient in the lithotomy position under spinal anæsthesia, Trumble's self-retaining abdominal retractor was arranged for vaginal retraction and an electro-section of the vaginal vault performed over the prominence of the tumour. It soon became apparent that the growth was a highly vascular, soft, friable, encapsulated sarcoma. So much hæmorrhage occurred that the operation had to be abandoned with the patient in a collapsed state, but not before about half the bulk of the mass had been excavated by a combination of electric "scalloping" and *morcellement.* Had the tumour been a firm myoma, I am sure we would have succeeded in completely removing it by endothermy. As it was, we were unable to compel that dryness of the operative field which successful electro-surgery postulates.

A few days later we contrived to convert our discomforture into a vindication of conservatism by utilizing the cavity in the heart of the tumour as a centre of intensive radiation. Fifty milligrammes of radium element in numerous small platinum containers were attached to the periphery of a globular piece of rubber sponge, the size of a billiard ball, with as even a distribution as possible. This "bomb" applicator was packed into the hollow sarcoma for a period of one hundred and sixty hours (Figure IV).

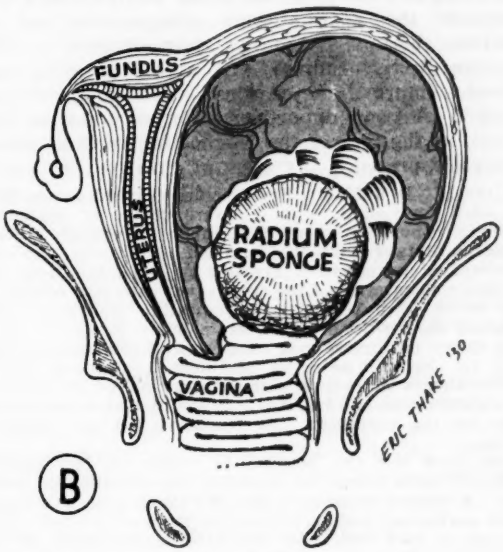

FIGURE IV.
Intra-ligamentary myo-sarcoma: radium packed into cavity excavated by endothermy. (From *The Journal of the College of Surgeons of Australasia.*)

This irradiation of 8,000 milligramme-hours caused the complete disappearance of the mass. The only further treatment was deep X irradiation by Dr. H. Flecker at the Austin Hospital, since when (nearly two years) she has been performing her ordinary avocations in perfect health.

Uterine Carcinomata.

Epithelial cancer (that is, carcinoma) attacks the uterus in two strikingly different fashions. In the tabular statements we have already discriminated between the corporeal and cervical forms and it is necessary from every point of view, especially that of treatment, to regard each form as a separate entity.

To state the differences as briefly as possible: Carcinoma of the uterine body, as distinct from the cervix, is much the rarer disease; it is characteristically a disease of elderly *nulliparæ*; it is slow to transgress the confines of the uterus in the initial phases of its pathogenesis; it is almost invariably adeno-carcinomatous in histological character; it is relatively radio-resistant. Carcinoma of the cervix, on the other hand, is chiefly a disease of parous women with an earlier age-incidence than corpus carcinoma; it tends readily and rapidly to permeate the adjoining lymphatic field; with few exceptions it is epidermoid in structure; it is relatively radio-sensitive. Morphological types of uterine carcinoma are well illustrated in the photographs (Figures V, VI, VII, VIII, IX, X, XI, XII, XIII).

Adeno-Carcinoma Corporis Uteri.

From the characteristics scheduled above it will be supposed that in the treatment of *adeno-carcinoma corporis uteri* surgical excision is

[1] On May 1, 1931, X irradiation was being administered for pelvic peritoneal recurrence.

theoretically preferable to irradiation. In practice this supposition has proved to be correct although the adoption of excision when feasible does not preclude the advantageous preoperative use of radium therapy. Appropriately applied to the uterine cavity, radium will arrest bleeding and thereby improve the prospect of a poor surgical "risk." A good opportunity for so doing is presented at the time of the diagnostic curettage which generally precedes any form of curative therapy.

CASE IV: In 1927 Mr. Fay Maclure referred to me Miss T., aged forty-eight, with a severe degree of secondary anæmia, obviously dependent upon irregular uterine bleeding of twelve months' duration.

Bimanual examination revealed no deviation from the normal configuration of the organs, but curettage confirmed our worst fears before the adjudicating microscope pronounced the verdict of adeno-carcinoma.

A thirty millimetre gold tube, of wall thickness equivalent to one millimetre of platinum, containing twenty milligrammes of radium element, was placed in one end of a rubber tube and inserted into the uterine cavity at the time of the curettage. It remained for one hundred hours.

She soon left the hospital to return in two months infinitely more robust by reason of the cessation of bleeding. A radical excision of the Wertheim type was thereupon performed and uninterrupted recovery ensued. The patient is now well past the third anniversary of her operation, which she celebrates by undergoing a "follow-up" examination in my surgery.

I am aware that my employment of Wertheim's excision for these cases is open to the objection of needless severity, and in response to such criticism I am gradually modifying my practice in the direction of less radical measures.

Vaginal hysterectomy and total hysterectomy by the abdominal route, both of which I have employed, are doubtless quite sufficient in most cases. Since noticing several patients with early ovarian metastasis I recommend the removal of the ovaries as a necessary part of any operation, and in deference to this mode of spread I think post-operative X irradiation advisable.

Several factors, not as yet mentioned, may conspire to prevent the feasibility of surgical removal of carcinoma of the uterine body. Extreme obesity, complicating systemic disease, senescence, inoperable extent of the neoplasm, geographical situation of the patient, refusal of patient's consent—these are several of the everyday factors that must be considered in deciding the expediency of any possible treatment.

Whenever it is feasible and expedient, complete surgical excision is the ideal treatment of *adeno-carcinoma corporis uteri* and gives good results. Although one is obsessed with a strong faith in this creed, it is extraordinary how occasionally a lack of judgement will, with a concatenation of adverse circumstances, connive at one's undoing.

CASE V: Mrs. B., aged sixty-two, was a childless widow, ungracious and unlikeable, whose miserly nature prevented her from consulting her country medical adviser until over eighteen months after the onset of metrorrhagia. Her doctor, appreciating the dangerous nature of her symptoms, immediately recommended her to the general surgical department of the Alfred Hospital. Staying with friends whilst awaiting a vacancy, she developed obstructive jaundice at the height of which attack she was admitted to hospital and subjected to operation for gall stones. After an uninterrupted recovery her surgeon undertook the repair of a large ventral hernia in the scar of an old subumbilical laparotomy. This operation was also a brilliant success, but it was only when she was ready for discharge to a convalescent home that the uterine bleeding was brought to the notice of the gynæcologist. Although still apparently confined to the uterus, the presence of corporeal carcinoma was certain before the confirmation of a diagnostic curettage.

In deference to the multiplicity of abdominal operations already performed upon this woman, I decided on cavitational radium therapy and thereby sacrificed her one chance of cure by surgical excision. After five months' apparent relief she returned from her home in the country with a large uterine tumour as high as the umbilical level. Laparotomy was too late. The soft friable hæmorrhagic tumour had burst the bounds of the uterus and was everywhere adherent to mesentry, omentum and coils of intestine. In four weeks she was dead with visceral metastases (liver, lung).

Not all corporeal carcinomata are as radio-resistant as the foregoing. Döderlein and Voltz (Münich) use radium therapy and X irradiation as a routine in preference to surgical operation and publish excellent results.

In my own series there are patients who are apparently cured after radium therapy alone. In Appendix B are set out the results of radium treatment in our patients (category A).

Carcinoma Cervicis Uteri.

Although the results of surgical excision in corpus carcinoma are generally good, similar results are not obtainable in cervix carcinoma. In the latter the problem is much more difficult. Since the introduction of the Wertheim operation thirty years ago masters of technique, such as Bonney, have periodically published results considerably better than any previously achieved. During the last ten years, however, results at least equal, if not better, have been obtained by radiotherapy.

From a comparatively small and brief personal experience of both methods of treatment my opinion is that radium therapy is desirable in every case of *carcinoma cervicis* that is at all amenable to treatment.

This does not mean that surgery has no place in the management of these cases, but it does mean that radium application should constitute the initial treatment in all. This dictum is warranted by the remarkable detergent and hæmostatic action of radium, apart from its curative properties. Provided the quality of the radium therapy is adequate and the growth is not unusually radio-resistant, then the prospect of cure will depend upon the extent of the disease. The more restricted the neoplasia, the more certain the success. In other words, the early growth (Stage I)[1] is the one ideally suitable for radium therapy. The difficulty of invariably attesting with certainty a strictly cervical limitation of the growth means that occasionally an unsuspected lymphatic extension will fault the radium

[1] The classification corresponds to that adopted by the League of Nations Radiological Sub-Committee (*vide* Appendix "A.").

treatment owing to its somewhat restricted sphere of action.

Nevertheless, in any such case the local and general state of the patient will have improved so considerably that exploratory laparotomy may be undertaken whenever, after the first month or two, an indication of failure is discovered. If, with the abdomen open, excision is feasible and the condition warrants it, Wertheim's operation should be carried out. As an alternative a supply of gold implants containing 1·5 millicuries of radon should be ready for transperitoneal insemination with Souttar's magazine-introducer. To illustrate this policy the following cases may be cited.

CASE VI: On examination of Mrs. C., aged forty-two, for genital hæmorrhage and discharge a flat C-shaped epithelioma was discovered on the *portio vaginalis cervicis*. The lesion closely resembled a chancre, but microscopy settled the differential diagnosis. An earlier and more circumscribed case would rarely be encountered. She represented what I have heard an enthusiast for the Wertheim operation describe as a "sitter." Nevertheless we applied radium (interstitial, intrauterine and vaginal), and though her "cure" is thus far barely a year in duration, I feel confident it will be permanent without further treatment.

CASE VII: On July 27, 1930, Miss O'L., aged thirty-seven, had a submaximal dose of radium applied to a foul second stage cervical growth with immediate and marked improvement in general health. The primary growth soon healed, and at the monthly examinations thereafter the only defect was a suspicious thickening in each parametrium.

When a slight but persistent discharge recurred five months later, we opened the abdomen for the purpose of implanting radon seeds. This intention was abandoned in favour of radical excision when it appeared that this was feasible. The operation successfully removed cancerous obturator lymph glands as well as a large epidermoid endocervical tumour (Figure IX). The patient is now obviously enjoying a second lease of life. May it be a long one!

CASE VIII: On December 23, 1930, we undertook to treat M.W., aged sixty years, for an inoperable epidermoid carcinoma of the cervix. A preliminary vaginal application of radium element was given and then a week later, with the abdomen opened, thirty radon seeds (1·5 millicuries) were widely and uniformly distributed in the lymphatic field surrounding the cervix (anterior, lateral and utero-sacral). Fourteen days later the course of radium therapy was completed by a further application of the element *per vaginam*. Up to the present the result has been good.

Radiological Technique.

Practically no use has been made of X irradiation as a primary treatment in this series. We have had to rely on radium treatment only. The specifications of radium applicators have already been given. Our technique of *per vaginam* radium therapy has combined until recently the interstitial and cavitational methods. Latterly we have been inclined to drop the interstitial needling and to follow Regaud more closely in cavitational applications.

A typical treatment formerly would consist of:

1. Interstitial application: (*a*) Ten one-milligramme needles as a circumferential "barrage" around the cervix; (*b*) three two-milligramme needles pushed up into each broad ligament (with a guiding finger in the rectum).

2. Cavitational application: (*a*) Intrauterine (in cervical canal), one twenty-milligramme tube or two ten-milligramme tubes in tandem; (*b*) vaginal (across the vault), two 10-milligramme tubes side by side.

In addition to the wall thickness of platinum the intrauterine tubes have a secondary filtration with two millimetres of rubber tubing and the vaginal tubes have a covering of one centimetre of cork. Vaginal tamponade keeps all applicators in position for 100 to 150 hours. This gives a dose of from 6,000 to 9,000 milligramme-hours.

More recently a typical treatment would be entirely cavitational, thus:

(*a*) Intrauterine application: One five-milligramme *plus* one ten-milligramme *plus* one five-milligramme tubes in tandem.

(*b*) Vaginal application: One ten-milligramme *plus* one five-milligramme *plus* one ten-milligramme tubes side by side, using a colpostat.

These applicators are packed in for a day or two at a time, being removed for short intervals between multiple applications. The total duration of irradiation is from 150 to 180 hours, giving 3,000 to 3,600 milligramme-hours intrauterine dose and 3,750 to 4,500 milligramme-hours dose in the vagina.

The following is a typical case history:

CASE IX: K.F., aged forty-one years, was admitted on July 22, 1930, with a history of recent floodings preceded by five months' watery discharge. Examination revealed a gigantic, fungating, friable mass replacing the cervix and filling the vaginal vault. Marked bilateral parametic infiltration was present (Stage II) (*vide* Figures XIV, XV, XVI). Microscopical examination revealed well differentiated epidermoid carcinoma. The following treatment was instituted. Two applications of radium were made at short intervals. The interstitial application was 360 milligramme-hours, the intrauterine application was 750 milligramme-hours, the vaginal application was 3,910 milligramme-hours (see Figure XVI and Appendix D).

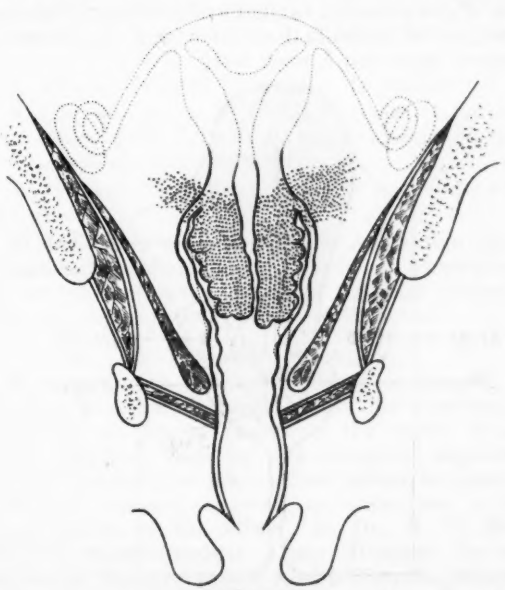

FIGURE XIV.
Formal graphic record (coronal section) of Case IX. (Regaud chart, supplied by Commonwealth Department of Health.)

Repetition of the radium treatment at intervals of six months or longer has been occasionally practised in this series. Vigilance in the follow-up department will increase the scope and efficacy of such treatments.

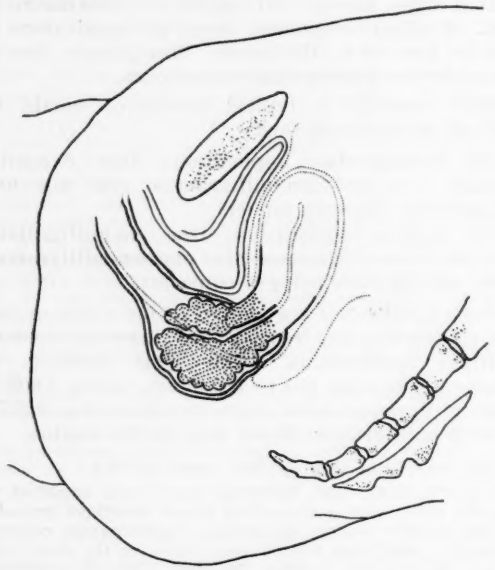

FIGURE XV.
Formal graphic record (sagittal section) of Case IX. (Regaud chart, supplied by Commonwealth Department of Health.)

Surgical Technique.

It will not be necessary to discuss surgical technique in any detail. All the excisions have been by the abdominal route (Wertheim) with the exception of one extended vaginal hysterectomy (Shauta). One partial abdominal excision was completed by vaginal operation a week later.

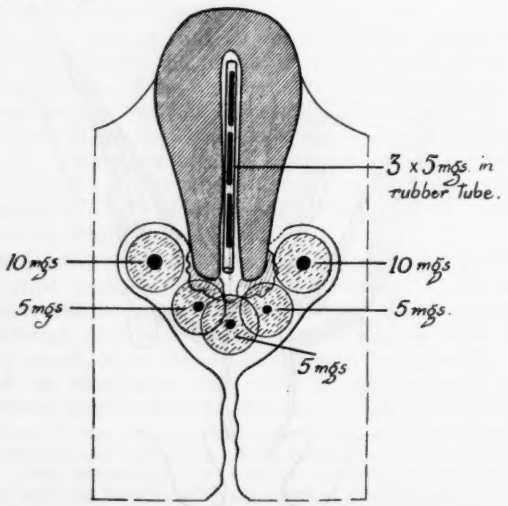

FIGURE XVI.
Formal graphic record (coronal section) of the type and position of radium applicators used in Case IX. (Regaud chart, supplied by Commonwealth Department of Health.)

I have been influenced in technical details by the descriptions and demonstrations of Victor Bonney and by the account published in *Surgery, Gynecology and Obstetrics* by Professor Franz, of Berlin (October, 1921).

Anæsthesia has usually been obtained by spinal injection of "Novocain" supplemented by ether inhalation. Hæmostasis is the chief care, and fine thread is used for ligatures. After amputation no attempt is made to suture the lower end of the vagina, which remains open to act as a natural drainage channel. Artificial drainage is not employed.

I have performed the Wertheim operation on thirty-four occasions as follows: Five times for "precancerous" cervix; twenty-one times for *carcinoma cervicis* (seven patients alive, one 5 years, two 3 years, two 2 years, two under 2 years after operation, fourteen patients dead); eight times for *carcinoma corporis* (five patients alive, one for 6 years, four over 3 years after operation, three patients dead).

The patient treated by the Shauta operation is alive and well after three years; the patient who had the combined abdomino-perineal excision survived two years and died of recurrence.

Operation versus Radium in Cervix Cancer.

Of the many who consider surgical and radiological methods to be mutually exclusive, most now give preference to radium therapy.

All honour to Wertheim and his followers (of whom I claim to be one) who have succeeded in the salvage of human lives by heroic surgery! Nowadays, however, expert radiotherapy must be credited with results at least equal to those obtainable by surgical operation, and with infinitely less sacrifice.

The advantages of radium therapy are these: (i) It does not deter patients from seeking advice; (ii) it is applicable to almost all patients presenting; (iii) it is devoid of primary mortality and mutilation; (iv) its technique is easier of acquisition than is operative skill; (v) its results are rapidly improving. As long as five years ago the best radium practice could show a 20% absolute cure rate and 40% for operable and border-line cases. However, it appears to us probable that although gynæcological radium therapy has usurped pride of place in the treatment of cervix cancer, the surgical art must ever be its sponsor. Even the comparatively simple manœuvre of radium application *per vaginam* is rendered more dextrous by a training in vaginal surgery.

In my opinion radium therapy does not prejudice subsequent excision which may be employed with advantage in those border-line cases previously irradiated without satisfactory response. In determining the advisability of supplementary excision we may look for guidance to the histological findings. The rarer adeno-carcinomata of the cervix should in all probability be invariably excised after preliminary irradiation.

In the case of the epidermoid carcinomata the occasional presence of a high degree of cell differentiation or the reverse (anaplasia) is worth taking into account. Besides a slower rate of growth there is a tendency for a highly differentiated cornifying epithelioma to be less sensitive radium than one that is anaplastic in character. For these reasons, whereas a combination of radium and excision might succeed with highly differentiated tumours, one would be ill advised to attempt surgical removal in anaplastic growths.

An interesting note upon the histological grading of *carcinoma cervicis* will be found in the paper by Dr. R. A. Willis, published in this issue.

Nor must we forget the utility of surgery of access in enlarging the scope of radio-activity. A method for attacking malignant infiltration of the pelvic cellular tissue by transperitoneal insemination of radon seeds has been already detailed. As a field for clinical research this development has decided possibilities.

Our results in the treatment of cervical carcinoma are given in detail in the attached tabular statements.

The "Precancerous" Cervix.

Before concluding this paper one last word is necessary concerning the treatment of the "precancerous" cervix. Although this is a somewhat hypothetical condition, most gynæcologists would agree that the "ugly" cervix, that is a combination of erosion, ectropion, hypertrophy and polycystic degeneration, should be regarded as potentially malignant. Radical and limited excisions with repair operations have each their indications according to the individual needs of the case.

I have been much impressed with the value of linear cauterization and ignipuncture for the cure of these conditions. The endothermic needle is used to puncture muco-purulent ovules and appropriately "tattoo" raw areas. Several repetitions may be required before final smooth squamous investment is secured, but should it not occur in six to eight weeks, we suspect a cancerous condition. Besides being a simple and efficacious treatment for an exceedingly common condition, this method affords a therapeutic test of malignancy.

Conclusion.

I make no apology for the continual use in this paper of the first person. Authentic personal experiences are very necessary in the formulation of authoritative Australian opinion upon topics such as this.

I am anxious that this study, the largest yet published in Australia, should stimulate the gynæcologists of this country to publish their results.

The premature publication of my results (that is, long before we can speak of five-year cures) may be excused if it is looked upon as a progress report of the work we are doing for the international (League of Nations) inquiry into the treatment of cancer of the uterine cervix. If other Australian gynæcologists will cooperate in this work, so much the better.

If we clinicians are to obtain any inspiration from a review such as I have just recounted, it will inevitably be in the realization of the importance of careful organization in our work. Individually we may control a small sector of the fighting line in the clinical combat with cancer, but it is incumbent upon us to organize that sector in conformity with the general plan of campaign. We must keep accurate clinical records; we must endeavour to standardize treatment without sacrificing that individual initiative that instinctively makes modifications to suit special circumstances; we must establish a follow-up system which readily keeps under review all patients for a period of at least five years; last, but not least, we must never lose an opportunity for clinical research.

As the "eyes" of the army are in close contact with the enemy, so are the growing points of medical knowledge in close contact with disease. If your sector is fortunate enough to possess the collaboration of laboratory workers, encourage the intimacy of the liaison and forever divert their attention into clinical channels. Medical research, however, unlike therapeutic method, is incapable of standardization and must never be hampered by the impediment of bureaucratic control.

Summary.

1. A clinical study of 164 cases of uterine cancer is presented.

2. The limitations of treatment are discussed and the low percentage of absolute cures (about 20%) is deplored.

3. The management of advanced cases is described.

4. The organization of a gynæcological cancer clinic is described.

5. The importance of biopsies is emphasized.

6. The relative and combined scope of surgical and radiological methods in the treatment of hopeful cases is discussed in detail.

7. Tabular statements of results to March, 1931, are given.

8. A plea is made for other Australian gynæcologists to publish similar records and to cooperate in the international (League of Nations) investigation of cancer of the uterine cervix.

Acknowledgements.

I acknowledge my indebtedness to Dr. W. J. Penfold, Director, Baker Institute, for constructive criticism of various phases of the work; to Dr. John Bastow, formerly Radiological Registrar, Alfred Hospital, for much of the labour involved in collecting records, as well as assistance in the organization of the clinic; to Dr. N. T. Bull, Medical Superintendent, Austin Hospital, for collection of the appropriate Austin Hospital records; to Dr. E. S. J. King for photographing the specimens in Figures V to XIII inclusive; to Dr. R. A. Willis for pathological work, which is beyond praise.

Appendix A.

Statement of Cancer Patients Treated with Radium since the Commencement of Operations in the Year 1927 to December 31, 1930. Period covered, 3½ Years.

Cancer Group.	Number of Patients Treated.	Treatment.							Results of Treatment.									Remarks.
				Radium in conjunction with—					Apparently Cured.		Local Improvement.				Not Improved.			
(a) *Carcinoma Corporis Uteri.*	(b)	(c) Radium Only.	(d) Radium Emanation.	(e) X Rays.	(f) Excision. (Omit Minor Surgery of Access.)	(g) Diathermy.	(h) Chemical Methods.	(i) Any Other Form.	(j) Alive and Apparently Cured.	(k) Apparently Cured, but Died of Intercurrent Disease or Injury.	(l) Local Improvement.	(m) Local Improvement. Recurrence Metastases.	(n) Local Improvement. Died from Metastases.	(o) Local Improvement. Died from Other Causes.	(p) Not improved.	(q) Not Improved. Died.	(r) No Information.	
Operable	5	3	—	—	2	—	—	—	4	—	—	—	—	—	—	1	—	(a) All microscopically proven. (c) Of the three "operable" patients, two were very obese. (f) Four Wertheim operations. One vaginal hysterectomy. (j) Longest = three years. (m) This patient had a large ovarian metastasis conglomerate with uterus at time of operation.
Borderline ..	2	—	—	—	2	—	—	—	—	—	—	—	—	—	—	2	—	
Inoperable ..	3	3	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	
Very advanced ..	3	2	—	—	1	—	—	—	—	—	—	1	—	—	—	2	—	
TOTAL NUMBER OF CASES TREATED	13	8	—	—	5	—	—	—	4	—	—	1	—	—	—	7	1	

[1] This is the form supplied by the Commonwealth Department of Health.

Appendix B.

Radium Treatment in Case IX.

Date.	(a) Apparatus (Form of) (a) Radium Tubes. (c) Radium Needles. (b) Radium Plates. (d) Emanation. Serial Numbers.	(b) Screen.	(c) Quantity of Radium or Emanation used.	(d) Time.	(e) Dose, Mgm.-hours, Mc.-hours.	(f) Distance if superficial.	(g) Region Treated.	(h) Notes.
First Treatment:								
23/7/30	Five needles (each 1·0 mgm.)	0·5 mm. platinum	5·0 mgm.	72 hours	360 mgm.-hours		Interstitial	Needles implanted in mass in cervix.
23/7/30	Four tubes:							
	(two of 10·0 mgm. each) ..	1·0 mm. platinum	20·0 mgm.	72 hours	2,160 mgm.-hours		Vaginal	Tubes in corks in vaginal vault.
	(two of 5·0 mgm. each) ..	1·0 cm. cork	10·0 mgm.	72 hours				
Second Treatment:								
28/7/30	Three tubes (each of 5·0 mgm.)..	1·0 mm. platinum 2·0 mm. rubber	15·0 mgm.	50 hours	750 mgm.-hours		Intrauterine	Tubes in "tandem" in rubber tubing.
28/7/30	Two tubes (each of 10·0 mgm.)..	1·0 mm. platinum	35·0 mgm.	50 hours	1,750 mgm.-hours		Vaginal	Tubes in corks in vaginal vault.
	Three tubes (each of 5·0 mgm.)..	1·0 cm. cork						

Appendix C.

Radium Treatment in Case with Carcinoma Cervicis Uteri Treated Initially by Radium.

Appendix C.

Thirty-seven Patients with Carcinoma Cervicis Uteri Treated Initially by Radium.

Year of Treatment.	Total.			Stage 1.			Stage 2.			Stage 3.			Stage 4.			Detail of Treatment.
	A.	D.	U.	A.	D.	U.	A.	D.	U.	A.	D.	U.	A.	D.	U.	
1926	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—	Radium only.
	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	Radium and excision.
1927	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Radium only.
	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	Radium and excision.
1928	2	—	1	—	—	—	2	—	—	—	—	1	—	—	—	Radium only.
	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	Radium and excision.
1929	6	4	2	2	—	2	3	—	1	1	4	1	—	—	—	Radium only.
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Radium and excision.
1930	12	2	2	1	—	—	5	—	—	5	2	2	1	—	—	Radium only.
	2	—	—	—	—	—	2	—	—	—	—	—	—	—	—	Radium and excision.
TOTALS	22	10	5	3	—	—	12	3	1	6	7	4	1	—	—	
		37		3			16			17			1			

Notes: A. = Alive, D. = Dead, U. = Untraced } Calculated to March, 1931.

Appendix D.

Classification of Carcinoma Cervicis into Stages according to the Anatomical Extent of the Growth.

Stage 1: Strictly limited to cervix. Uterus mobile.

Stage 2: Lesion spreading into one or more fornices with or without early infiltration of the parametrium, the uterus retaining some degree of mobility.

Stage 3: (*a*) Nodular infiltration of the parametrium on both sides extending to the wall of the pelvis, and limited mobility of the uterus or a massive infiltration of one parametrium with fixation of the uterus. (*b*) More or less superficial infiltration of a large extent of the vagina with a mobile uterus. (*c*) Isolated metastases in the pelvic glands with a relatively small primary growth. (*d*) Isolated metastases in the lower part of the vagina.

(Generally speaking, all cases not falling into Stage 2 or 4 will be placed in Stage 3.)

Stage 4: (*a*) Cases of massive infiltration of both parametria extending to walls of pelvis. (*b*) Carcinoma involving bladder or rectum. (*c*) The whole vagina infiltrated (or one wall throughout its whole length) with fixation of the primary growth. (*d*) Remote metastases.

SOME ASPECTS OF THE PATHOLOGY OF UTERINE CARCINOMA.

By RUPERT A. WILLIS, M.D. (Melbourne),
Pathologist to the Alfred Hospital, Melbourne.
(From the Baker Medical Research Institute.)

THE material which forms the basis of this brief account is in large part identical with that of Mr. R. Fowler's accompanying therapeutic study. To Mr. Fowler's major paper mine is but an addendum; but I have taken advantage of this opportunity to emphasize certain features of uterine carcinoma which, while not stressed in surgical and pathological literature, have a distinct bearing on treatment and prognosis. To exemplify many of the points discussed I include a tabular epitome of the last twenty cases of carcinoma of the uterus which I have studied at autopsy. In all of these cases complete examination of all organs, including microscopical study of every abnormality found, was carried out; but only positive relevant features are given in the table.

Histological Classification of Uterine Carcinomata.

Uterine carcinomata fall into two main groups: (i) adeno-carcinoma, (ii) epidermoid carcinoma. The majority of corporeal growths belong to the first class, while most cervical cancers are of the second type. However, epidermoid tumours of the corporeal endometrium do occur, and a not infrequent type exhibits keratinizing squamous-cell areas in an otherwise frank

TABLE.

Case Number.	Histological Type.	Site of Origin.	Lymphatic Glands Involved.	Hæmatogenous Metastases.	Other Features of Special Interest.
I	Epidermoid.	Cervix.	Iliac.	—	Invasion of a large ovarian cyst.
II	Epidermoid.	Cervix.	—	—	Pyometra and general peritonitis.
III	Epidermoid.	Cervix.	—	—	—
IV	Epidermoid.	Cervix.	Iliac and lumbar.	—	—
V	Epidermoid.	Cervix.	—	—	—
VI	Epidermoid.	Cervix.	Lower lumbar.	—	—
VII	Epidermoid.	Cervix.	Inguinal and lumbar.	—	Inferior *vena cava* invaded by gland deposits.
VIII	Epidermoid.	Cervix.	—	—	Small cystic ovary invaded.
IX	Epidermoid, highly anaplastic.	Cervix.	Iliac, retroperitoneal, mediastinal, cervical.	Lungs and liver.	Direct invasion of ovary and of pelvic peritoneum. Thoracic duct invaded from cœliac glands.
X	Epidermoid.	Cervix.	Iliac and lumbar.	Liver.	"Gizzard" infiltration of rectal wall.
XI	Epidermoid.	Cervix.	—	—	—
XII	Epidermoid.	Cervix.	—	—	—
XIII	Mucoid adeno-carcinoma.	Cervix.	Lumbar and mesenteric.	Lungs.	Contact invasion of ileum and appendix. Right iliac vein invaded.
XIV	Epidermoid.	Cervix.	Iliac and lumbar.	—	—
XV	Epidermoid.	Cervix.	—	Liver.	—
XVI	Epidermoid.	Cervix.	Inguinal.	Lung.	—
XVII	Epidermoid.	Cervix.	—	—	—
XVIII	Adeno-carcinoma.	Corpus.	—	—	—
XIX	Adeno-carcinoma, highly anaplastic.	Corpus.	—	Lung.	Fungation of large medullary tumour into peritoneal cavity, with extensive implantation deposits. Large uterine veins invaded.
XX	Highly anaplastic.	Doubtful.	—	Lungs.	—

adeno-carcinoma (Figure I). Conversely, adeno-carcinoma, though usually corporeal, occasionally arises in the cervix; and cervical adeno-carcinomata are frequently conspicuously mucoid in character (Figure II).

The degree of differentiation of the cells of uterine growths is variable. Most adeno-carcinomata are well differentiated, but disorderly and anaplastic examples are seen, and an initially well formed columnar-celled adeno-carcinoma may assume subsequent rapid growth and diffuse structure. Thus, in July, 1930, Case XIX yielded diagnostic curettings depicted in Figure III, while autopsy in March, 1931, disclosed a huge encephaloid tumour which presented a diffuse "sarcomatous" type of growth with no trace of adenomatous structure (Figure IV).

Probably in no other class of neoplasms does a greater range of histological pictures occur than in epidermoid cancers of the *cervix uteri*. The degree of keratinization, the size and shape of the cell clumps, and the characters of the cells and their nuclei, all present wide variations. Cornification appears as well defined cell nests or pearls much less frequently than in oral and cutaneous carcinomata, but patchy and irregular keratin formation is frequent. The cell clumps are usually large and often of characteristic angular or lentiform outlines. The structural peculiarities of the individual cells are legion, and often heterogeneous in the one tumour. Giant and multinucleated forms are common. Some tumours possess a predominant spindle cell structure, and the spindle cells may form whorls or fasciculi. None of the foregoing characters necessarily betokens a true anaplasia or high degree of malignancy; for such features may all be found in tumours of clinically slow growth and histologically slight mitotic activity. A relatively small group of cervical cancers, however, are frankly anaplastic, presenting irregularly or diffusely arranged cells, with many mitotic figures, and possessing rapid invasive properties and a high incidence of local and remote metastases. The polymorphous structure of epidermoid carcinomata of the uterine cervix is illustrated in Figures V to IX.

Histological Grading of Uterine Carcinomata.

Endeavours to make clinically useful histological gradings of various neoplasms are as old as the microscopical study of tumours, and there has emerged more and more clearly the general principle that a high degree of differentiation usually denotes slow growth and relatively low grade malignancy, while lack of differentiation or anaplasia usually denotes rapid growth and high malignancy. Many of the recent formulæ for grading tumours according to malignancy, for example, those of Broders, MacCarty *et cetera*, do little more than focus attention on this long recognized principle. Of such methods Ewing says: "One may readily assent to the general soundness of these criteria. They have been used by pathologists for many decades." (1)

While it is certainly true that there exists a broad general relationship between histological structure and the intrinsic malignancy of a tumour, many extrinsic factors place great limitations on purely histological prognosis. These include the extent of the growth, the presence of unsuspected lymph nodal or visceral metastases, the general condition of the patient, the uncertainty of biopsy specimens being fairly representative of the entire tumour, and the fluctuations in the rate of growth which are known to occur in many neoplasms, as for example, in the tumour depicted in Figures III and IV. All such factors greatly diminish the value of arbitrary methods of grading applied to biopsy specimens.

Carcinomata of the *cervix uteri* are particularly difficult to grade satisfactorily because, as we have seen, such a large proportion of them (perhaps 80%) are of indifferent histological character, being

ILLUSTRATIONS TO THE ARTICLE BY DR. ROBERT FOWLER.

FIGURE V.
Fungating encephaloid *carcinoma cervicis.*

FIGURE VI.
Fungating fibroid *carcinoma cervicis.*

FIGURE VII.
Ulcerating crateriform *carcinoma cervicis.*

FIGURE VIII.
Ulcerating carcinoma of cervical canal.

FIGURE IX.
Infiltrating *carcinoma cervicis* producing a "barrel" cervix difficult of detection clinically.

FIGURE X.
Infiltrating *carcinoma cervicis* invading the uterine body.

FIGURE XI.
Infiltrating and ulcerating *carcinoma cervicis* replacing the entire uterus.

FIGURE XII.
Carcinoma corporis (with double pyosalpinx).

FIGURE XIII.
Portion of caseating sarcoma of uterine body.

ILLUSTRATIONS TO THE ARTICLE BY DR. RUPERT A. WILLIS.

FIGURE I.
Adeno-carcinoma of the body of the uterus, showing squamous-cell transformation. The growth was a pedunculated papillary tumour at the fundus. × 250.

FIGURE II.
(Case XIII of Table.)
From the lung metastases of a mucoid adeno-carcinoma of the cervix. × 250.

FIGURE III.
(Case XIX of Table.)
Adeno-carcinoma in diagnostic curettings in July, 1930. × 250.

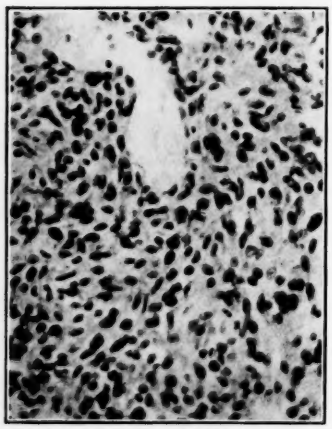

FIGURE IV.
(Same case as Figure III.)
Anaplastic "sarcoma"-like growth from autopsy in March, 1931. × 250.

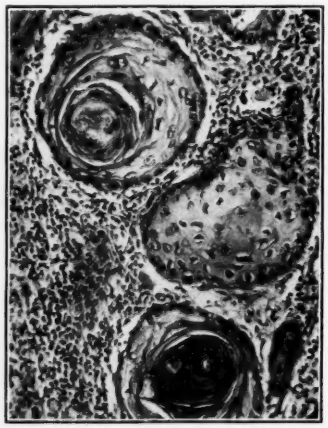

FIGURE V.
Keratinizing carcinoma of the cervix with well formed epithelial pearls. × 100.

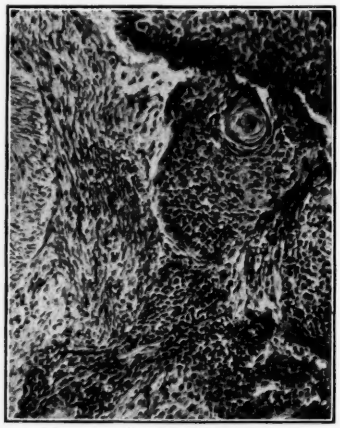

FIGURE VI.
Epidermoid carcinoma of the cervix with small, scanty pearls. × 100.

FIGURE VII.
Epidermoid carcinoma of the cervix similar in general structure to Figure VI, but devoid of epithelial pearls. × 100.

FIGURE VIII.
Epidermoid carcinoma of the cervix with irregular clumps and columns of cells and hyperchromatic bizarre nuclei. × 100.

FIGURE IX.
Frankly anaplastic epidermoid carcinoma of the cervix, showing diffuse invasion of tissues by large epithelial cells devoid of any orderly arrangement. × 100.

neither highly differentiated in any particular direction nor yet frankly anaplastic. It is not surprising, then, that Ewing says of suggestions for grading: "In the case of the uterus most of these efforts have been announced as comparative failures."

Some of the methods adopted have been frankly unsatisfactory. Thus Hueper[3] has advocated using no less than twenty arbitrary criteria in assessing the malignancy of cervix cancer. In a given growth each of the twenty points is given "marks," and the total is called the "malignancy index" of the tumour. Clearly such methods are subject to a multiplicity of personal errors and are of little scientific value.

The most satisfactory of the grading methods for *carcinoma cervicis* is that advocated by Healy.[2] He uses three groups. Group A is the small group of highly differentiated cornifying squamous-celled cancers. Group C is the small group of frankly anaplastic atypical growths with many mitotic figures. Between these two extremes lies the large Group B of nondescript nature, neither typically squamous-celled nor frankly anaplastic in type. Even then Healy states that it is "impossible to draw a sharp line of distinction between the three histological groups." Group A contained 17% of Healy's cases, Group B 62% and Group C 21%. He concludes that the three groups correspond to "three degrees of potential malignancy, as well as to three grades of radio-sensitivity (low, medium and high)." The best surgical results were obtained in the highly differentiated Group A, the worst in the anaplastic Group C. Lacassagne,[4] contrary to Healy, however, finds that the histological type of cervix cancers bears no relation to the degree of radio-sensitivity, and that adequate radio-therapy achieves equally good results in all types.

The opinion of the present writer is that only very broad distinctions are permissible in histologically subdividing carcinomata of the cervix. The chief features to be observed are the degree of anaplasia in the tumour, its peripheral infiltrative capacity, and the number of mitotic figures in the tumour cells. These features enable a general estimate of intrinsic malignancy, which may be of value to the surgeon in determining the line of treatment.

The Local Spread of Uterine Carcinoma.

Carcinoma of the Cervix.

Well established cervical cancer appears as (i) an excavated ulcer, or (ii) a fungating or cauliflower growth projecting into and distending the vagina, or (iii) a diffuse induration and thickening of the cervix. From any of these lesions extension may occur in any direction. Caudal infiltration into the vaginal walls is frequent and necessitates the removal of a liberal vaginal cuff in performing panhysterectomy. Cranial extension into the body of the uterus may be pronounced, sometimes finally effecting almost complete replacement of the organ. Of great practical importance is the not infrequent type of growth which ascends far into the corpus without producing visible or palpable changes at the cervical orifice. The pelvic peritoneum, especially in the pouch of Douglas, may be involved by cranial extension, and transcœlomic omental and mesenteric deposits may arise in this way. Lateral extension into the parametrial tissues is of great significance, since on its extent frequently depends the operability of the condition. In advanced cases the growth reaches the bony walls of the pelvic cavity and produces absolute fixity of the viscera. Ureteric involvement is frequent, and the fatal issue in many cases depends on ascending renal infection from this cause. Anterior extension involves the bladder, and posterior extension the rectum, and fistulæ of these organs are distressingly common in advanced cases. Figures X and XI illustrate many of the modes of extension mentioned.

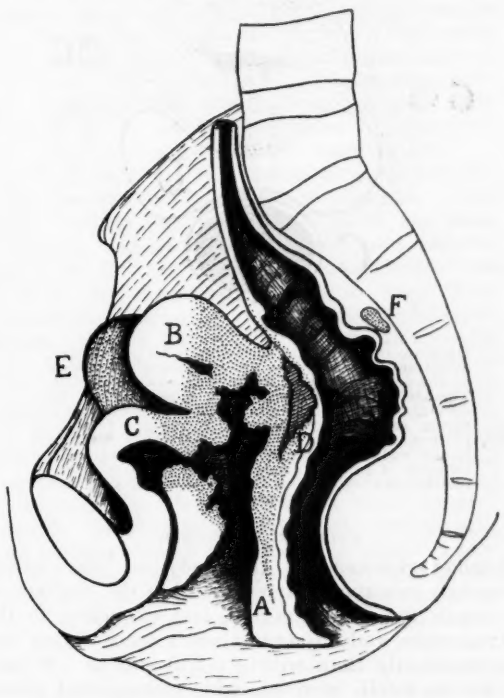

FIGURE X.

Drawing of median section of an entire pelvis obtained at autopsy, showing routes of local extension of an epidermoid carcinoma of the cervix. Growth is indicated by stippling. A = caudal extension in posterior vaginal wall and recto-vaginal septum. B = ascending invasion of the uterus. C = anterior extension to the bladder with fistula formation. D = posterior extension to the rectal wall and peritoneum, and loculated abscess in pouch of Douglas. E = large metastases in right iliac lymph glands. F = deposit of growth in a sacral lymph gland.

In the accompanying table are exemplified also certain special results of the direct spread of cancer of the cervix. In three instances (I, VIII and IX) the parametrial infiltration extended to involve the ovary, in Case I invading the cavity of an ovarian cyst eight centimetres in diameter. In Case II the primary growth consisted of a diffuse thickening of the entire cervix with stenosis of the canal, and the cause of death was a perforated

pyometra with general peritonitis. In Case X several inches of the wall of the rectum exhibited diffuse infiltration of "gizzard" or "leather-bottle" type, extending from a restricted area of contact invasion from the cervix. In Case XIII there was direct contact invasion of the appendix and of a coil of ileum, with death from intestinal obstruction.

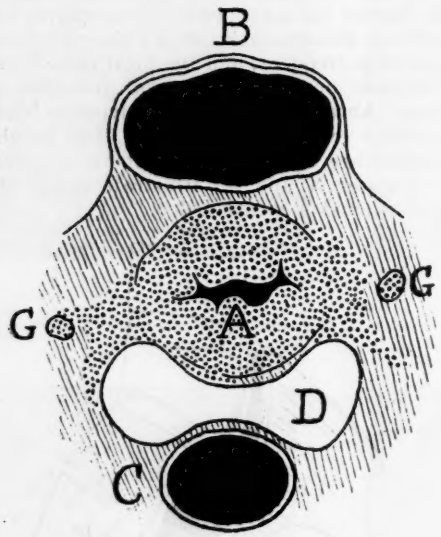

FIGURE XI.

Diagram of horizontal section of viscera removed at autopsy from a case of epidermoid carcinoma of the cervix, showing mode of lateral extension. The section passes through the upper part of the cervix. Growth is indicated by stippling. A = cervix replaced by growth. B = bladder. C = rectum. D = pouch of Douglas. G = discrete lymph nodal deposits in parametrium. Note also tongues of growth extending directly into parametrial tissues, and in the utero-sacral ligament of one side.

Corporeal Carcinoma.

Adeno-carcinoma of the body of the uterus frequently remains restricted within the confines of the organ for a long period, and extension to the parametrium and adjacent viscera occurs later and less constantly than with cervical cancer. Within the uterus itself, however, wide endometrial extension is frequent, perhaps involving the entire surface of the cavity and invading the lumina of the Fallopian tubes. On the other hand, endometrial carcinoma is sometimes remarkably restricted, so that while diagnostic curettings contain obviously malignant tissue, no trace of residual tumour is to be found in the subsequently excised uterus. Needless to say, however, very thorough search of the viscus by serial section is essential before concluding that curettage alone really had eradicated the disease. Recently I have studied such a case in which, however, microscopical study of all suspicious parts of the apparently normal uterus revealed a small cancerous focus deep in the myometrium near the entry of a Fallopian tube.

Corporeal carcinoma in its later phases may penetrate the peritoneum and produce implantation deposits on other viscera, an event exemplified in Case XIX of the table.

Lymphatic Metastases.

It is difficult to discriminate sharply between nodular invasion of the parametrial tissues and discrete deposits in the parametrial lymph glands. In many cases the lateral extension of the disease is effected by both modes of spread combined. The incidence of involvement of more remote lymph glands even at autopsy is not very high. Such involvement was present in only nine of my twenty tabulated cases, and the figure must be considerably lower in surgical material. Clearly, then, uterine carcinoma manifests a decided tendency to remain localized to the uterus and its environs, so that surgical and radio-therapeutic measures are favoured by intrinsically greater possibilities of permanent success than is the case with many other regions.

In deciding the operability or otherwise of a uterine growth, examination for possible lymph gland metastases is, of course, of great importance. Pelvic, abdominal, inguinal and cervical regions should all be investigated. In my tabulated twenty cases the various gland groups were involved as follows: lumbar and retroperitoneal in seven, iliac in five, inguinal in two, and mesenteric, mediastinal and cervical each in one. Corporeal carcinoma frequently spares the lymph glands until a late stage of the disease.

There is not sufficient recognition of the ovaries as a site of metastasis from adeno-carcinoma of the body of the uterus. Several examples of this condition have come under my notice in examining surgical material. One of these was the growth depicted in Figure I of this paper. The ovaries in this case presented numerous small, superficial, pink, raised spots, which histological study revealed to be foci of columnar-celled adeno-carcinoma; the squamous-celled component present in the primary tumour was not represented in the ovarian metastases. The uterine growth extended only a short distance into the myometrium, and the peritoneum was not involved, so that the ovarian deposits could scarcely have arisen by transcœlomic implantation. Hæmatogenous metastasis would be highly unlikely to produce multiple ovarian deposits of the kind described; and this patient presented no evidence of blood-borne metastases elsewhere. The most probable route of origin of the secondary foci in the ovaries would appear, then, to be *viâ* parametrial lymphatic channels, probably those passing laterally from the cornua of the uterus along the Fallopian tubes. Since such ovarian deposits may accompany an operable uterine growth and may be the only visible extrauterine extensions of the neoplasm, the practical importance of this mode of metastatic spread is obvious. I have not seen metastases in the ovary from cervical carcinoma.

Hæmatogenous Metastases.

Blood-borne secondary growths in remote viscera, though not of great frequency in uterine cancer, are

by no means negligible. They were present in seven of my twenty tabulated autopsy cases, an incidence of 35%. The lungs were involved in five cases and the liver in three. The hepatic deposits arise in most cases, probably *viâ* the portal blood stream, for the rectum and adjacent peritoneum are frequently the seat of malignant infiltration (see Cases IX and X). The invasion of systemic veins, on the other hand, an event observed in Cases VII, XIII and XIX, provides a source of malignant emboli to the lungs, which in two of these three cases contained metastatic growths. In Case IX, however, the liberation of embolic fragments from the invaded thoracic duct was probably the principal origin of the pulmonary growths. It is noteworthy that in all three cases in the series in which the primary tumour was highly anaplastic in character, remote metastases were present.

References.

(1) J. Ewing: "Neoplastic Diseases," 1928, page 64.
(2) W. P. Healy: "Classification and Radiation Treatment of Cancers of the Cervix Uteri," "Report of International Conference on Cancer, London," 1928, page 86.
(3) W. C. Hueper: "The Relation of the Histological Structure to the Prognosis of the Carcinomata of the Uterine Cervix," *Surgery, Gynecology and Obstetrics*, 1928, Volume 47, page 502.
(4) A. Lacassagne: "The Causes of Success and Failure in the Radiotherapy of Cancer of the Cervix Uteri," "Report of International Conference on Cancer, London," 1928, page 82.

THE TREATMENT OF UTERINE CANCER.[1]

By W. CUSCADEN, M.D. (Melb.), F.R.C.S. (Edin.),
Honorary Surgeon, Women's Hospital, Melbourne.

THE report that I present covers the work of the Women's Hospital Radium Clinic for the period from July 10, 1929, to June 30, 1930.

Cases are only considered as cancer when sections have been examined by a competent pathologist (Dr. Mollison) and definitely declared to be malignant. This has caused the exclusion of a number of cases clinically cancerous, but open to doubt on microscopical examination. But unless this is adhered to strictly, statistics are useless. All patients lost sight of are counted as dead.

All sections for microscopical examination are taken with a punch of the Luc type. They can be taken in the out-patient department with no risk of causing hæmorrhage and little discomfort.

In cancer of the cervix the first thing that strikes one is that 75% of the growths are advanced when the patients first present themselves for treatment. I spent eleven months in the Bonney Clinic and have been in the Wertheim Clinic (Graf and Werner) and have done many Wertheim operations myself and should be a judge of operability. The majority of the patients had seen some medical man before coming into hospital and some more than one. It seems tragic that in many cases no effort has been made even to carry out a proper examination.

Many of the patients have pronounced cachexia and anæmia was marked. A number of patients had one transfusion of 10 cubic centimetres of blood, some had two and one had three transfusions before being fit for treatment. Blood urea was estimated in all the older patients, and when the figures suggested renal inefficiency, rest and preliminary medication have always been given before the actual treatment was started. The arbitrary standard treatment with radium has been 85 milligrammes of radium for 100 hours shielded by the equivalent of two millimetres of platinum and rubber tubing.

The radium was distributed 10 milligrammes in the body of the uterus, 25 milligrammes in the cervix, and 50 milligrammes in the vagina. Few of the patients have any rise of temperature and very little discomfort. In those treated with emanation only 60 millicuries and upward were implanted in the growth and the surrounding broad ligament. Ten of the patients in whom radium was implanted, had an additional implantation of radon in the broad ligament.

A head-light is a great help in this work. With care emanation can be placed nearly as far back as the iliac bifurcation. In all cases in which the vagina is not too constricted, I always insert a quadrilateral pessary under the radium; it serves to force the rectum backward and the bladder forward. This has helped to reduce the incidence of proctitis; radium proctitis is a troublesome complication.

All patients with proctitis should be given paraffin to keep the motions as soft as possible. With diarrhœa nothing but opium will check the pain and straining, but aspirin, phenacetin and caffeine are sufficient for the milder cases. Through the proctoscope the condition is seen to vary from plum-coloured congestion to superficial indolent ulceration. Fortunately this latter condition seems rare. I have not seen any more serious forms. Radium cystitis is much more rare. I have seen two later cases of radium cystitis occurring about twelve months after treatment. Radium cystitis is liable to be mistaken for recurrence, but it is due to arteriosclerosis in the region of the trigone with death of the tissue deprived of the blood supply. It seems to clear up easily with rest, citrates and washing out the bladder with saline solution. I saw one patient whose bladder somebody had washed out with weak silver nitrate solution; extensive sloughing resulted. In my series is one case of sarcoma of the cervix which had a standard radium treatment followed by 25 millicuries of radon evenly divided in the broad ligament. She is now well and has recently resumed marital relations.

The patients with cancer of the body have had radium or radon directly implanted into the growth with an endoscope. Where hæmorrhage is troublesome, packing with adrenalin gauze clears the field. A larger dose can be given thus direct to the growth with less risk to the patient.[1] A study of the microscopical section of the growth seems to help in deciding the prognosis. Broders or Marltzoff's index should not be taken too seriously, but a rough estimate is useful. Organized structure, mature-looking cells and desmoplastic properties are of bad import. Possibly we may later recommend for operation some not very radiosensitive patients whose growths are operable. The matter is open for very serious discussion.

[1] Read at the Second Australian Cancer Conference, Canberra, March, 1931.

[1] I have described the method of implantations in detail in "Cancer Supplement" to *Health*, September, 1930.

Appendix A.

Statement of Cancer Patients Treated with Radium since the Commencement of Operations in the Year 1927 to December 31, 1930. Period covered, 3½ Years.

Cancer Group.	Number of Patients Treated.	Treatment.							Results of Treatment.									Remarks.
				Radium in conjunction with—					Apparently Cured.		Local Improvement.				Not Improved.			
(a) *Carcinoma Corporis Uteri.*	(b)	(c) Radium Only.	(d) Radium Emanation.	(e) X Rays.	(f) Excision. (Omit Minor Surgery of Access.)	(g) Diathermy.	(h) Chemical Methods.	(i) Any Other Form.	(j) Alive and Apparently Cured.	(k) Apparently Cured, but Died of Intercurrent Disease or Injury.	(l) Local Improvement.	(m) Local Improvement. Recurrence Metastases.	(n) Local Improvement. Died from Metastases.	(o) Local Improvement. Died from Other Causes.	(p) Not Improved.	(q) Not Improved. Died.	(r) No Information.	
Operable	5	3	—	—	2	—	—	—	4	—	—	—	—	—	—	1	—	(a) All microscopically proven. (c) Of the three "operable" patients, two were very obese. (f) Four Wertheim operations. One vaginal hysterectomy. (j) Longest = three years. (m) This patient had a large ovarian metastasis conglomerate with uterus at time of operation.
Borderline ..	2	—	—	—	2	—	—	—	—	—	—	—	—	—	—	2	—	
Inoperable ..	3	3	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	
Very advanced ..	3	2	—	—	1	—	—	—	—	—	—	1	—	—	—	2	—	
TOTAL NUMBER OF CASES TREATED	13	8	—	—	5	—	—	—	4	—	—	1	—	—	—	7	1	

[1] This is the form supplied by the Commonwealth Department of Health.

Appendix B.

Radium Treatment in Case IX.

Date.	(a) Apparatus (Form of) (a) Radium Tubes. (c) Radium Needles. (b) Radium Plates. (d) Emanation. Serial Numbers.	(b) Screen.	(c) Quantity of Radium or Emanation used.	(d) Time.	(e) Dose, Mgm.-hours, Mc.-hours.	(f) Distance if superficial.	(g) Region Treated.	(h) Notes.
First Treatment:								
23/7/30	Five needles (each 1·0 mgm.)	0·5 mm. platinum	5·0 mgm.	72 hours	360 mgm.-hours		Interstitial	Needles implanted in mass in cervix.
23/7/30	Four tubes:							
	(two of 10·0 mgm. each) ..	1·0 mm. platinum	20·0 mgm.	72 hours	2,160 mgm.-hours		Vaginal	Tubes in corks in vaginal vault.
	(two of 5·0 mgm. each) ..	1·0 cm. cork	10·0 mgm.	72 hours				
Second Treatment:								
28/7/30	Three tubes (each of 5·0 mgm.)..	1·0 mm. platinum 2·0 mm. rubber	15·0 mgm.	50 hours	750 mgm.-hours		Intrauterine	Tubes in "tandem" in rubber tubing.
28/7/30	Two tubes (each of 10·0 mgm.)..	1·0 mm. platinum	35·0 mgm.	50 hours	1,750 mgm.-hours		Vaginal	Tubes in corks in vaginal vault.
	Three tubes (each of 5·0 mgm.)..	1·0 cm. cork						

Appendix C.

Thirty-seven Patients with Carcinoma Cervicis Uteri Treated Initially by Radium.

Year of Treatment.	Total.			Stage 1.			Stage 2.			Stage 3.			Stage 4.			Detail of Treatment.
	A.	D.	U.	A.	D.	U.	A.	D.	U.	A.	D.	U.	A.	D.	U.	
1926	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—	Radium only.
	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	Radium and excision.
1927	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Radium only.
	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	Radium and excision.
1928	2	—	1	—	—	—	2	—	—	—	—	1	—	—	—	Radium only.
	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	Radium and excision.
1929	6	4	2	2	—	—	3	—	1	1	4	1	—	—	—	Radium only.
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Radium and excision.
1930	12	2	2	1	—	—	5	—	—	5	2	2	1	—	—	Radium only.
	2	—	—	—	—	—	2	—	—	—	—	—	—	—	—	Radium and excision.
Totals	22	10	5	3	3	—	12	3	1	6	7	4	1	1	—	*Notes:* A. = Alive, D. = Dead, U. = Untraced } Calculated to March, 1931.
	37			3			16			17			1			

Appendix D.

Classification of Carcinoma Cervicis into Stages according to the Anatomical Extent of the Growth.

Stage 1: Strictly limited to cervix. Uterus mobile.

Stage 2: Lesion spreading into one or more fornices with or without early infiltration of the parametrium, the uterus retaining some degree of mobility.

Stage 3: (*a*) Nodular infiltration of the parametrium on both sides extending to the wall of the pelvis, and limited mobility of the uterus or a massive infiltration of one parametrium with fixation of the uterus. (*b*) More or less superficial infiltration of a large extent of the vagina with a mobile uterus. (*c*) Isolated metastases in the pelvic glands with a relatively small primary growth. (*d*) Isolated metastases in the lower part of the vagina.

(Generally speaking, all cases not falling into Stage 2 or 4 will be placed in Stage 3.)

Stage 4: (*a*) Cases of massive infiltration of both parametria extending to walls of pelvis. (*b*) Carcinoma involving bladder or rectum. (*c*) The whole vagina infiltrated (or one wall throughout its whole length) with fixation of the primary growth. (*d*) Remote metastases.

SOME ASPECTS OF THE PATHOLOGY OF UTERINE CARCINOMA.

By RUPERT A. WILLIS, M.D. (Melbourne),
Pathologist to the Alfred Hospital, Melbourne.
(From the Baker Medical Research Institute.)

THE material which forms the basis of this brief account is in large part identical with that of Mr. R. Fowler's accompanying therapeutic study. To Mr. Fowler's major paper mine is but an addendum; but I have taken advantage of this opportunity to emphasize certain features of uterine carcinoma which, while not stressed in surgical and pathological literature, have a distinct bearing on treatment and prognosis. To exemplify many of the points discussed I include a tabular epitome of the last twenty cases of carcinoma of the uterus which I have studied at autopsy. In all of these cases complete examination of all organs, including microscopical study of every abnormality found, was carried out; but only positive relevant features are given in the table.

Histological Classification of Uterine Carcinomata.

Uterine carcinomata fall into two main groups: (i) adeno-carcinoma, (ii) epidermoid carcinoma. The majority of corporeal growths belong to the first class, while most cervical cancers are of the second type. However, epidermoid tumours of the corporeal endometrium do occur, and a not infrequent type exhibits keratinizing squamous-cell areas in an otherwise frank

TABLE.

Case Number.	Histological Type.	Site of Origin.	Lymphatic Glands Involved.	Hæmatogenous Metastases.	Other Features of Special Interest.
I	Epidermoid.	Cervix.	Iliac.	—	Invasion of a large ovarian cyst.
II	Epidermoid.	Cervix.	—	—	Pyometra and general peritonitis.
III	Epidermoid.	Cervix.	—	—	—
IV	Epidermoid.	Cervix.	Iliac and lumbar.	—	—
V	Epidermoid.	Cervix.	—	—	—
VI	Epidermoid.	Cervix.	Lower lumbar.	—	—
VII	Epidermoid.	Cervix.	Inguinal and lumbar.	—	Inferior *vena cava* invaded by gland deposits.
VIII	Epidermoid.	Cervix.	—	—	Small cystic ovary invaded.
IX	Epidermoid, highly anaplastic.	Cervix.	Iliac, retroperitoneal, mediastinal, cervical.	Lungs and liver.	Direct invasion of ovary and of pelvic peritoneum. Thoracic duct invaded from cœliac glands.
X	Epidermoid.	Cervix.	Iliac and lumbar.	Liver.	"Gizzard" infiltration of rectal wall.
XI	Epidermoid.	Cervix.	—	—	—
XII	Epidermoid.	Cervix.	—	—	—
XIII	Mucoid adeno-carcinoma.	Cervix.	Lumbar and mesenteric.	Lungs.	Contact invasion of ileum and appendix. Right iliac vein invaded.
XIV	Epidermoid.	Cervix.	Iliac and lumbar.	—	—
XV	Epidermoid.	Cervix.	—	Liver.	—
XVI	Epidermoid.	Cervix.	Inguinal.	Lung.	—
XVII	Epidermoid.	Cervix.	—	—	—
XVIII	Adeno-carcinoma.	Corpus.	—	—	—
XIX	Adeno-carcinoma, highly anaplastic.	Corpus.	—	Lung.	Fungation of large medullary tumour into peritoneal cavity, with extensive implantation deposits. Large uterine veins invaded.
XX	Highly anaplastic.	Doubtful.	—	Lungs.	—

adeno-carcinoma (Figure I). Conversely, adeno-carcinoma, though usually corporeal, occasionally arises in the cervix; and cervical adeno-carcinomata are frequently conspicuously mucoid in character (Figure II).

The degree of differentiation of the cells of uterine growths is variable. Most adeno-carcinomata are well differentiated, but disorderly and anaplastic examples are seen, and an initially well formed columnar-celled adeno-carcinoma may assume subsequent rapid growth and diffuse structure. Thus, in July, 1930, Case XIX yielded diagnostic curettings depicted in Figure III, while autopsy in March, 1931, disclosed a huge encephaloid tumour which presented a diffuse "sarcomatous" type of growth with no trace of adenomatous structure (Figure IV).

Probably in no other class of neoplasms does a greater range of histological pictures occur than in epidermoid cancers of the *cervix uteri*. The degree of keratinization, the size and shape of the cell clumps, and the characters of the cells and their nuclei, all present wide variations. Cornification appears as well defined cell nests or pearls much less frequently than in oral and cutaneous carcinomata, but patchy and irregular keratin formation is frequent. The cell clumps are usually large and often of characteristic angular or lentiform outlines. The structural peculiarities of the individual cells are legion, and often heterogeneous in the one tumour. Giant and multinucleated forms are common. Some tumours possess a predominant spindle cell structure, and the spindle cells may form whorls or fasciculi. None of the foregoing characters necessarily betokens a true anaplasia or high degree of malignancy; for such features may all be found in tumours of clinically slow growth and histologically slight mitotic activity. A relatively small group of cervical cancers, however, are frankly anaplastic, presenting irregularly or diffusely arranged cells, with many mitotic figures, and possessing rapid invasive properties and a high incidence of local and remote metastases. The polymorphous structure of epidermoid carcinomata of the uterine cervix is illustrated in Figures V to IX.

Histological Grading of Uterine Carcinomata.

Endeavours to make clinically useful histological gradings of various neoplasms are as old as the microscopical study of tumours, and there has emerged more and more clearly the general principle that a high degree of differentiation usually denotes slow growth and relatively low grade malignancy, while lack of differentiation or anaplasia usually denotes rapid growth and high malignancy. Many of the recent formulæ for grading tumours according to malignancy, for example, those of Broders, MacCarty *et cetera*, do little more than focus attention on this long recognized principle. Of such methods Ewing says: "One may readily assent to the general soundness of these criteria. They have been used by pathologists for many decades." (1)

While it is certainly true that there exists a broad general relationship between histological structure and the intrinsic malignancy of a tumour, many extrinsic factors place great limitations on purely histological prognosis. These include the extent of the growth, the presence of unsuspected lymph nodal or visceral metastases, the general condition of the patient, the uncertainty of biopsy specimens being fairly representative of the entire tumour, and the fluctuations in the rate of growth which are known to occur in many neoplasms, as for example, in the tumour depicted in Figures III and IV. All such factors greatly diminish the value of arbitrary methods of grading applied to biopsy specimens.

Carcinomata of the *cervix uteri* are particularly difficult to grade satisfactorily because, as we have seen, such a large proportion of them (perhaps 80%) are of indifferent histological character, being

neither highly differentiated in any particular direction nor yet frankly anaplastic. It is not surprising, then, that Ewing says of suggestions for grading: "In the case of the uterus most of these efforts have been announced as comparative failures."

Some of the methods adopted have been frankly unsatisfactory. Thus Hueper[3] has advocated using no less than twenty arbitrary criteria in assessing the malignancy of cervix cancer. In a given growth each of the twenty points is given "marks," and the total is called the "malignancy index" of the tumour. Clearly such methods are subject to a multiplicity of personal errors and are of little scientific value.

The most satisfactory of the grading methods for *carcinoma cervicis* is that advocated by Healy.[2] He uses three groups. Group A is the small group of highly differentiated cornifying squamous-celled cancers. Group C is the small group of frankly anaplastic atypical growths with many mitotic figures. Between these two extremes lies the large Group B of nondescript nature, neither typically squamous-celled nor frankly anaplastic in type. Even then Healy states that it is "impossible to draw a sharp line of distinction between the three histological groups." Group A contained 17% of Healy's cases, Group B 62% and Group C 21%. He concludes that the three groups correspond to "three degrees of potential malignancy, as well as to three grades of radio-sensitivity (low, medium and high)." The best surgical results were obtained in the highly differentiated Group A, the worst in the anaplastic Group C. Lacassagne,[4] contrary to Healy, however, finds that the histological type of cervix cancers bears no relation to the degree of radio-sensitivity, and that adequate radio-therapy achieves equally good results in all types.

The opinion of the present writer is that only very broad distinctions are permissible in histologically subdividing carcinomata of the cervix. The chief features to be observed are the degree of anaplasia in the tumour, its peripheral infiltrative capacity, and the number of mitotic figures in the tumour cells. These features enable a general estimate of intrinsic malignancy, which may be of value to the surgeon in determining the line of treatment.

The Local Spread of Uterine Carcinoma.

Carcinoma of the Cervix.

Well established cervical cancer appears as (i) an excavated ulcer, or (ii) a fungating or cauliflower growth projecting into and distending the vagina, or (iii) a diffuse induration and thickening of the cervix. From any of these lesions extension may occur in any direction. Caudal infiltration into the vaginal walls is frequent and necessitates the removal of a liberal vaginal cuff in performing panhysterectomy. Cranial extension into the body of the uterus may be pronounced, sometimes finally effecting almost complete replacement of the organ. Of great practical importance is the not infrequent type of growth which ascends far into the corpus without producing visible or palpable changes at the cervical orifice. The pelvic peritoneum, especially in the pouch of Douglas, may be involved by cranial extension, and transcœlomic omental and mesenteric deposits may arise in this way. Lateral extension into the parametrial tissues is of great significance, since on its extent frequently depends the operability of the condition. In advanced cases the growth reaches the bony walls of the pelvic cavity and produces absolute fixity of the viscera. Ureteric involvement is frequent, and the fatal issue in many cases depends on ascending renal infection from this cause. Anterior extension involves the bladder, and posterior extension the rectum, and fistulæ of these organs are distressingly common in advanced cases. Figures X and XI illustrate many of the modes of extension mentioned.

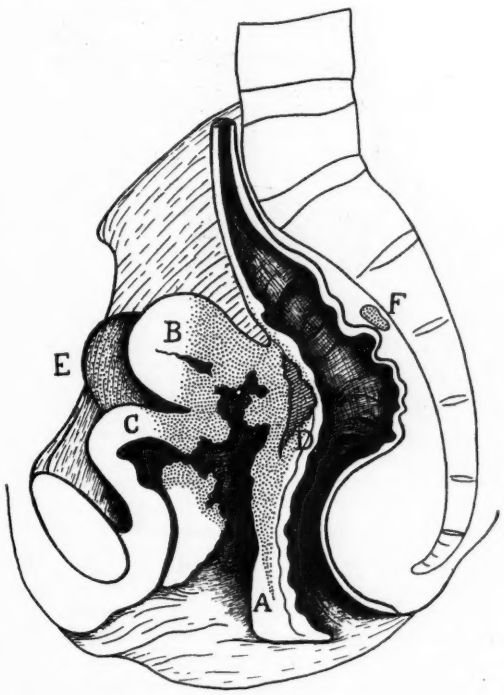

FIGURE X.

Drawing of median section of an entire pelvis obtained at autopsy, showing routes of local extension of an epidermoid carcinoma of the cervix. Growth is indicated by stippling. A = caudal extension in posterior vaginal wall and recto-vaginal septum. B = ascending invasion of the uterus. C = anterior extension to the bladder with fistula formation. D = posterior extension to the rectal wall and peritoneum, and loculated abscess in pouch of Douglas. E = large metastases in right iliac lymph glands. F = deposit of growth in a sacral lymph gland.

In the accompanying table are exemplified also certain special results of the direct spread of cancer of the cervix. In three instances (I, VIII and IX) the parametrial infiltration extended to involve the ovary, in Case I invading the cavity of an ovarian cyst eight centimetres in diameter. In Case II the primary growth consisted of a diffuse thickening of the entire cervix with stenosis of the canal, and the cause of death was a perforated

pyometra with general peritonitis. In Case X several inches of the wall of the rectum exhibited diffuse infiltration of "gizzard" or "leather-bottle" type, extending from a restricted area of contact invasion from the cervix. In Case XIII there was direct contact invasion of the appendix and of a coil of ileum, with death from intestinal obstruction.

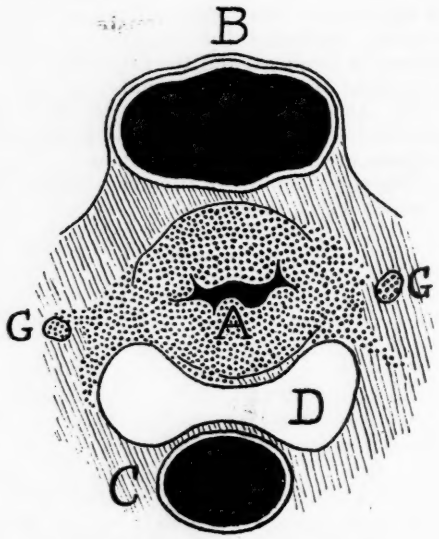

FIGURE XI.

Diagram of horizontal section of viscera removed at autopsy from a case of epidermoid carcinoma of the cervix, showing mode of lateral extension. The section passes through the upper part of the cervix. Growth is indicated by stippling. A = cervix replaced by growth. B = bladder. C = rectum. D = pouch of Douglas. G = discrete lymph nodal deposits in parametrium. Note also tongues of growth extending directly into parametrial tissues, and in the utero-sacral ligament of one side.

Corporeal Carcinoma.

Adeno-carcinoma of the body of the uterus frequently remains restricted within the confines of the organ for a long period, and extension to the parametrium and adjacent viscera occurs later and less constantly than with cervical cancer. Within the uterus itself, however, wide endometrial extension is frequent, perhaps involving the entire surface of the cavity and invading the lumina of the Fallopian tubes. On the other hand, endometrial carcinoma is sometimes remarkably restricted, so that while diagnostic curettings contain obviously malignant tissue, no trace of residual tumour is to be found in the subsequently excised uterus. Needless to say, however, very thorough search of the viscus by serial section is essential before concluding that curettage alone really had eradicated the disease. Recently I have studied such a case in which, however, microscopical study of all suspicious parts of the apparently normal uterus revealed a small cancerous focus deep in the myometrium near the entry of a Fallopian tube.

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It is difficult to discriminate sharply between nodular invasion of the parametrial tissues and discrete deposits in the parametrial lymph glands. In many cases the lateral extension of the disease is effected by both modes of spread combined. The incidence of involvement of more remote lymph glands even at autopsy is not very high. Such involvement was present in only nine of my twenty tabulated cases, and the figure must be considerably lower in surgical material. Clearly, then, uterine carcinoma manifests a decided tendency to remain localized to the uterus and its environs, so that surgical and radio-therapeutic measures are favoured by intrinsically greater possibilities of permanent success than is the case with many other regions.

In deciding the operability or otherwise of a uterine growth, examination for possible lymph gland metastases is, of course, of great importance. Pelvic, abdominal, inguinal and cervical regions should all be investigated. In my tabulated twenty cases the various gland groups were involved as follows: lumbar and retroperitoneal in seven, iliac in five, inguinal in two, and mesenteric, mediastinal and cervical each in one. Corporeal carcinoma frequently spares the lymph glands until a late stage of the disease.

There is not sufficient recognition of the ovaries as a site of metastasis from adeno-carcinoma of the body of the uterus. Several examples of this condition have come under my notice in examining surgical material. One of these was the growth depicted in Figure I of this paper. The ovaries in this case presented numerous small, superficial, pink, raised spots, which histological study revealed to be foci of columnar-celled adeno-carcinoma; the squamous-celled component present in the primary tumour was not represented in the ovarian metastases. The uterine growth extended only a short distance into the myometrium, and the peritoneum was not involved, so that the ovarian deposits could scarcely have arisen by transcœlomic implantation. Hæmatogenous metastasis would be highly unlikely to produce multiple ovarian deposits of the kind described; and this patient presented no evidence of blood-borne metastases elsewhere. The most probable route of origin of the secondary foci in the ovaries would appear, then, to be *viâ* parametrial lymphatic channels, probably those passing laterally from the cornua of the uterus along the Fallopian tubes. Since such ovarian deposits may accompany an operable uterine growth and may be the only visible extrauterine extensions of the neoplasm, the practical importance of this mode of metastatic spread is obvious. I have not seen metastases in the ovary from cervical carcinoma.

Hæmatogenous Metastases.

Blood-borne secondary growths in remote viscera, though not of great frequency in uterine cancer, are

by no means negligible. They were present in seven of my twenty tabulated autopsy cases, an incidence of 35%. The lungs were involved in five cases and the liver in three. The hepatic deposits arise in most cases, probably *viâ* the portal blood stream, for the rectum and adjacent peritoneum are frequently the seat of malignant infiltration (see Cases IX and X). The invasion of systemic veins, on the other hand, an event observed in Cases VII, XIII and XIX, provides a source of malignant emboli to the lungs, which in two of these three cases contained metastatic growths. In Case IX, however, the liberation of embolic fragments from the invaded thoracic duct was probably the principal origin of the pulmonary growths. It is noteworthy that in all three cases in the series in which the primary tumour was highly anaplastic in character, remote metastases were present.

References.

(1) J. Ewing: "Neoplastic Diseases," 1928, page 64.
(2) W. P. Healy: "Classification and Radiation Treatment of Cancers of the Cervix Uteri," "Report of International Conference on Cancer, London," 1928, page 86.
(3) W. C. Hueper: "The Relation of the Histological Structure to the Prognosis of the Carcinomata of the Uterine Cervix," *Surgery, Gynecology and Obstetrics*, 1928, Volume 47, page 502.
(4) A. Lacassagne: "The Causes of Success and Failure in the Radiotherapy of Cancer of the Cervix Uteri," "Report of International Conference on Cancer, London," 1928, page 82.

THE TREATMENT OF UTERINE CANCER.[1]

By W. CUSCADEN, M.D. (Melb.), F.R.C.S. (Edin.),
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THE report that I present covers the work of the Women's Hospital Radium Clinic for the period from July 10, 1929, to June 30, 1930.

Cases are only considered as cancer when sections have been examined by a competent pathologist (Dr. Mollison) and definitely declared to be malignant. This has caused the exclusion of a number of cases clinically cancerous, but open to doubt on microscopical examination. But unless this is adhered to strictly, statistics are useless. All patients lost sight of are counted as dead.

All sections for microscopical examination are taken with a punch of the Luc type. They can be taken in the out-patient department with no risk of causing hæmorrhage and little discomfort.

In cancer of the cervix the first thing that strikes one is that 75% of the growths are advanced when the patients first present themselves for treatment. I spent eleven months in the Bonney Clinic and have been in the Wertheim Clinic (Graf and Werner) and have done many Wertheim operations myself and should be a judge of operability. The majority of the patients had seen some medical man before coming into hospital and some more than one. It seems tragic that in many cases no effort has been made even to carry out a proper examination.

Many of the patients have pronounced cachexia and anæmia was marked. A number of patients had one transfusion of 10 cubic centimetres of blood, some had two and one had three transfusions before being fit for treatment. Blood urea was estimated in all the older patients, and when the figures suggested renal inefficiency, rest and preliminary medication have always been given before the actual treatment was started. The arbitrary standard treatment with radium has been 85 milligrammes of radium for 100 hours shielded by the equivalent of two millimetres of platinum and rubber tubing.

The radium was distributed 10 milligrammes in the body of the uterus, 25 milligrammes in the cervix, and 50 milligrammes in the vagina. Few of the patients have any rise of temperature and very little discomfort. In those treated with emanation only 60 millicuries and upward were implanted in the growth and the surrounding broad ligament. Ten of the patients in whom radium was implanted, had an additional implantation of radon in the broad ligament.

A head-light is a great help in this work. With care emanation can be placed nearly as far back as the iliac bifurcation. In all cases in which the vagina is not too constricted, I always insert a quadrilateral pessary under the radium; it serves to force the rectum backward and the bladder forward. This has helped to reduce the incidence of proctitis; radium proctitis is a troublesome complication.

All patients with proctitis should be given paraffin to keep the motions as soft as possible. With diarrhœa nothing but opium will check the pain and straining, but aspirin, phenacetin and caffeine are sufficient for the milder cases. Through the proctoscope the condition is seen to vary from plum-coloured congestion to superficial indolent ulceration. Fortunately this latter condition seems rare. I have not seen any more serious forms. Radium cystitis is much more rare. I have seen two later cases of radium cystitis occurring about twelve months after treatment. Radium cystitis is liable to be mistaken for recurrence, but it is due to arteriosclerosis in the region of the trigone with death of the tissue deprived of the blood supply. It seems to clear up easily with rest, citrates and washing out the bladder with saline solution. I saw one patient whose bladder somebody had washed out with weak silver nitrate solution; extensive sloughing resulted. In my series is one case of sarcoma of the cervix which had a standard radium treatment followed by 25 millicuries of radon evenly divided in the broad ligament. She is now well and has recently resumed marital relations.

The patients with cancer of the body have had radium or radon directly implanted into the growth with an endoscope. Where hæmorrhage is troublesome, packing with adrenalin gauze clears the field. A larger dose can be given thus direct to the growth with less risk to the patient.[1] A study of the microscopical section of the growth seems to help in deciding the prognosis. Broders or Marltzoff's index should not be taken too seriously, but a rough estimate is useful. Organized structure, mature-looking cells and desmoplastic properties are of bad import. Possibly we may later recommend for operation some not very radiosensitive patients whose growths are operable. The matter is open for very serious discussion.

[1] Read at the Second Australian Cancer Conference, Canberra, March, 1931.

[1] I have described the method of implantations in detail in "Cancer Supplement" to *Health*, September, 1930.

STATEMENT OF PATIENTS TREATED WITH RADIUM AT THE WOMEN'S HOSPITAL, MELBOURNE, SINCE THE COMMENCEMENT OF OPERATION[1] IN JULY, 1929, TO THE END OF JUNE, 1930.

* Cancer Group.	Stage.	Number of Cases Treated.	Treatment.							Results of Treatment.								Remarks.
			Radium only.	Radium Emanation.	Radium in conjunction with: X Rays.	Radium in conjunction with: Excision. (Omit Minor Surgery of Access.)	Radium in conjunction with: Diathermy.	Radium in conjunction with: Chemical Methods.	Radium in conjunction with: Any Other Form.	Apparently Cured: Alive and Apparently Cured.	Apparently Cured: Apparently Cured, but Died of Intercurrent Disease or Injury.	Local Improvement.	Local Improvement. Recurrent Metastases.	Local Improvement. Died from Metastases.	Local Improvement. Died from Other Causes.	Not Improved.	Not Improved. Died.	No Information.	
III, 6 C. Carcinoma *cervicis uteri.*	Operable	5	4	—	—	1	—	—	—	1	—	1	2	—	—	—	1	—	10 had emanation as well.
	Borderline	3	2	—	—	—	—	1	—	2	—	—	—	—	—	—	1	—	
	Inoperable	19	19	—	—	—	—	—	—	4	—	—	—	—	1	—	13	—	
	Very Advanced	2	2	—	—	—	—	—	—	1	—	1	1	—	—	—	—	—	
	Total Number of Cases Treated	29	27	—	—	1	—	1	—	8	—	2	3	—	1	—	15	—	
VII, 7. Menorrhagia.	Operable	9	7	—	—	2	—	—	—	9	—	—	—	—	—	—	—	—	
	Borderline	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Inoperable	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Very Advanced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Total Number of Cases Treated	9	7	—	—	2	—	—	—	9	—	—	—	—	—	—	—	—	
III, 6 D. Carcinoma *corpus uteri.*	Operable	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
	Borderline	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Inoperable	1	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
	Very Advanced	1	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	
	Total Number of Cases Treated	3	2	1	—	—	—	—	—	2	—	1	—	—	—	—	—	—	
III, 6 B. Carcinoma of Vagina.	Operable	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Borderline	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Inoperable	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Very Advanced	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	
	Total Number of Cases Treated	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	
II, 7. Sarcoma.	Operable	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Borderline	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Inoperable	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
	Very Advanced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Total Number of Cases Treated	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
VII, 8. Various Non-Malignant.	Operable	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
	Borderline	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Inoperable	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Very Advanced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Total Number of Cases Treated	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
III, 4. Urinary System.	Operable	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Borderline	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Inoperable	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
	Very Advanced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Total Number of Cases Treated	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
III, 3 J. Carcinoma of Rectum.	Operable	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Borderline	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Inoperable	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Very Advanced	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	
	Total Number of Cases Treated	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	

[1] In the Commonwealth Form A a separate sheet is used for each Cancer Group. For convenience in publication, the Groups have been placed in one table.

* In defining the Cancer Group, the Commonwealth Index of Classification for Radiotherapeutic Centres should be used.

STATEMENT OF PATIENTS TREATED WITH RADIUM AT THE WOMEN'S HOSPITAL, MELBOURNE (*Continued*).

* Cancer Group.	Stage.	Number of Cases Treated.	Treatment.								Results of Treatment.									Remarks.
			Radium only.	Radium Emanation.	Radium in conjunction with						Apparently Cured.			Local Improvement.				Not Improved.		
					X Rays.	Excision. (Omit Minor Surgery of Access.)	Diathermy.	Chemical Methods.	Any Other Form.		Alive and Apparently Cured.	Apparently Cured, but Died of Intercurrent Disease or Injury.	Local Improvement.	Local Improvement. Recurrent Metastases.	Local Improvement. Died from Metastases.	Local Improvement. Died from Other Causes.	Not Improved.	Not Improved. Died.	No Information.	
III, 6 A. Carcinoma of the Vulva.	Operable	1				1					1									
	Borderline																			
	Inoperable																			
	Very Advanced																			
	Total Number of Cases Treated	1				1					1									
III, 7. Carcinoma of the Breast.	Operable																			
	Borderline																			
	Inoperable																			
	Very Advanced	1		1							1									
	Total Number of Cases Treated	1		1		1					1									

* In defining the Cancer Group, the Commonwealth Index of Classification for Radiotherapeutic Centres should be used.

The Commonwealth Index of Classification of Diseases for Radiotherapeutic Centres is attached. The accompanying tables show the results of treatment.

The Commonwealth Index of Classification of Diseases for Radiotherapeutic Centres.

Note.—The percentage given after each heading represents an attempt at estimating the proportion of each class of diseases to the whole.

I. Benign Tumours (5%).
- (*a*) Connective tissue tumours—
  1. Fibroma.
  2. Myoma (including fibro-myoma).
  3. Angioma (cavernous, capillary and mixed).
  4. Various.
- (*b*) Epithelial tumours—
  1. Papilloma (skin and elsewhere).
  2. Adenoma.

II. Sarcomata (6%).
1. Fibrosarcoma.
2. Lymphosarcoma.
3. Mixed celled (Polymorphic).
4. Round celled (small).
5. Round celled (large).
6. Spindle celled.
7. Other forms.

*III. *Carcinomata* (58%).
1. Skin and subcutaneous tissues.
2. Respiratory system—
   - (*a*) Nose (internal and sinuses).
     (*Note.*—External surface is classified under skin.)
   - (*b*) Larynx.
   - (*c*) Lungs and bronchi.
3. Alimentary system—
   - (*a*) Lips.
   - (*b*) Tongue.
   - (*c*) Mouth, tonsils, and pharynx.
   - (*d*) Jaws.
   - (*e*) Salivary glands.
   - (*f*) Œsophagus.
   - (*g*) Stomach.
   - (*h*) Intestines, large and small.
   - (*i*) Liver, gall bladder, and bile ducts.
   - (*j*) Rectum.
   - (*k*) Various.
4. Urinary system.
5. Male genital system—
   - (*a*) Penis.
   - (*b*) Prostate.
   - (*c*) Testicle.
     (*Note.*—Scrotum under skin.)
6. Female genital system—
   - (*a*) Vulva.
   - (*b*) Vagina.
   - (*c*) *Cervix uteri.*
   - (*d*) *Corpus uteri.*
   - (*e*) Ovary.
7. Breast.
8. Ductless glands—
   - (*a*) Thyreoid.
   - (*b*) Various.
9. Secondary (glands *et cetera*). Primary previously removed or not known.

IV. Malignant Diseases (*Various*) 12%).
1. Rodent ulcer (Basal celled Carcinomata).
2. Endothelioma.
3. Parotid tumours.
4. Various (hypernephroma, melanoma, teratoma *et cetera*).

V. Tumours of Doubtful Malignancy (1%).
1. Mediastinal tumour.
2. Papilloma of bladder.
3. Papilloma of rectum.
4. Various borderline.

* Epitheliomata (squamous celled carcinomata) are placed under this heading according to anatomical localization.

VI. Prophylaxis (3%). (Use only in those cases in which it is thought by the surgeon that the whole growth has been removed.)

1. Carcinoma.
2. Sarcoma.
3. Rodent ulcer.
4. Endothelioma.
5. Various.

VII. Various Diseases (*Non-Malignant*) (15%).

1. Blood diseases.
2. Chronic inflammation, *e.g.*, actinomycosis; tuberculous glands *et cetera*; some lesions of doubtful causation.
3. Exophthalmic goître.
4. Hodgkin's disease.
5. Skin diseases.
6. Spring catarrh.
7. Uterine hæmorrhage.
8. Various.

Reviews.

X RAY INTERPRETATION.

WE have received for review the fourth edition of "Roentgen Interpretation," by G. W. Holmes and H. E. Ruggles.[1] This work is one of the most useful works published on radiology, and is of value alike to the student and specialist. This edition brings the subject matter up to date, both in diagnosis and technique. The illustrations given are good typical skiagrams of the various pathological conditions met with, and the authors refer the reader to the various large works for more detailed descriptions. The introduction and first chapter should be read by all practitioners, as they deal with elementary mistakes which are commonly made by the unwary. The five points which form the basis of sound Röntgen interpretation are worth repeating: (1) Become familiar with the projected appearances of normal structures. (2) Use routine positions for all examinations. (3) Do not try to get too much on one large film, use several smaller ones. (4) Be thorough in the examination. (5) Do not express an opinion on poor films. If this advice were followed, fewer mistakes would be made. Interpreters are warned against mistaking roughening of bone margins and normal lines in the bones for fractures. Irregular calcifications, warts *et cetera* often lead to unusual Röntgen appearances.

Chapter II contains a most complete table of ossification times and should be kept handy for reference. Fractures and dislocations and diseases and tumours of bone receive detailed consideration and the information is given briefly and in simple language. In spinal examination the difficulty in obtaining good skiagrams of large areas is stressed and the authors advise that skiagrams be taken at various angles, especially in the lumbo-sacral region. The method of measurement of the size of the heart, which Holmes evolved, is again used and is a very simple method and of great use in comparing the different cases of cardiac disease and the progress of individual cases. In pulmonary disease fluoroscopy as well as radiography is recommended. Most tuberculous lesions occur at the periphery and in the upper portions of the lung fields. Extension towards the bases is very unusual and is difficult to recognize owing to the usual thickenings in these regions which occur in most adults. A very good description of lung abscess (with illustrative films and differential diagnosis difficulties) is contained in Chapter VIII. In suspected foreign body cases it is recommended that the whole respiratory tract be searched and skiagrams taken in several planes; the lateral view of the chest should be included. In the chapter on the gastro-intestinal tract, the authors rightly point out that the value of the fluoroscopic examination depends entirely on the skill and experience of the examiner, and he must be thoroughly trained. Thoroughness is essential and with a skilled worker the percentage of correct diagnosis should be from 90 to 95. At the end of each chapter a very complete bibliography is to be found.

[1] "Roentgen Interpretation: A Manual for Students and Practitioners," by G. W. Holmes, M.D., and H. E. Ruggles, M.D.; Fourth Edition; 1931. Philadelphia: Lea and Febiger; Australia: Angus and Robertson. Royal 8vo., pp. 351, illustrated with 237 engravings.

Analytical Department.

"ASPRINETTE."

"ASPRINETTE" is the name given to a chocolate-coated aspirin tablet, the product of a firm known as Asprinette Limited.

An inspection has been made of the processes of manufacture and packing, which are carried out at separate premises. Dry aspirin powder containing a small quantity of starch is compressed into tablets in a rotary tablet machine. The tablets are transferred to a confectioner's steam-jacketed pan, where they are coated by means of the application of chocolate-coloured syrup. When dried, the coating is polished by means of friction in two successive polishing pans. After a further period of drying in hot air the tablets are placed in airtight cans and dispatched to the city premises of Asprinette Limited, where they are repacked for distribution. They are wrapped in "Cellophane" tissue in lots of five and ten and enclosed in a paper container which is also covered with "Cellophane." Neither manufacture nor package necessitates actual handling.

The premises are clean and the persons engaged in the work both of manufacture and packing are clean in dress and appearance.

Samples obtained at the time of manufacture and of packing, and samples bought in the open market have been submitted to our analyst. He reports that each tablet contains five grains of aceto-salycylic acid, that no free salicylic acid is present and that the requirements of the British Pharmacopœia are met.

The tablets may be recommended as suitable for medicinal use. The chocolate coating will doubtless appeal to many to whom the taste of aspirin is disagreeable.

"HEPRON."

"HEPRON" tablets, a product of Glandular Preparations, Limited, of Sydney, consist of desiccated liver substance to which has been added *ferri et ammonii citras* in the proportion of four grains of desiccated liver to two grains of the iron compound. This iron salt contains at least 16% of iron. In order to discover whether the tablets have a uniform composition as regards iron content, batches of different numbers of tablets were taken and analysed for their iron content by Elvehjem's method, with the following results:

Batch (1) gave 0·0237 gramme of iron per tablet.
Batch (2) gave 0·0236 gramme of iron per tablet.
Batch (3) gave 0·0240 gramme of iron per tablet.

The iron as from the *ferri et ammonii citras* in each tablet should be 0·021 gramme. The small amount of additional iron is therefore probably contained in the dried liver substance.

The liver substance is prepared under the same process and is identical with "Hepabos," which was approved and reported upon by this journal in the issue of October 4, 1930.

One can conclude, therefore, that "Hepron" tablets each contain four grains of efficacious desiccated liver substance *plus* a constant amount, namely, two grains, of added *ferri et ammonii citras*.

This preparation should commend itself to the medical profession as an efficacious therapeutic agent in the treatment of secondary anæmia.

The Medical Journal of Australia

SATURDAY, SEPTEMBER 5, 1931.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

LABORATORY AIDS TO DIAGNOSIS.

AN innovation was made in this journal in July, 1930, when the first of a series of special articles on diagnosis was published. The series has been continued without interruption till last week, when the final article appeared. The series has been most useful and many expressions of appreciation of the work of the authors have been received. Attention was drawn in July of last year, firstly, to the fact that the discovery of the newer methods of clinical examination and the introduction of laboratory tests have simplified many of the problems of differential diagnosis, and, secondly, to the danger of regarding diagnosis as a matter of exclusion or confirmation by test tube or microscope. It is, or should be, superfluous to state that laboratory investigations are only aids to diagnosis and not means of diagnosis. When the symptoms have been studied, when the diathesis has been considered, when the patient's psychological condition has been investigated, then and only then should laboratory tests and examinations be utilized. The student during his hospital training is taught to carry out certain tests, to make blood counts and to undertake biochemical examination of body fluids. He sees these things being done in the investigation of the condition of nearly every patient in the wards. It is not to be wondered at that he sometimes learns to look upon them as unduly important. He does not always realize that in his general practice of the future most of his patients will not suffer from diseases either as obscure or as severe as those of the patients in his wards. When this realization is forced upon him, he may, if his teaching has been inadequate, go to the other extreme and neglect laboratory tests and investigations when they are most needed. And here it may be stated that in at least one of the three Australian medical schools clinical pathology has been the most imperfectly taught of all the subjects in the curriculum.

Some years ago, in a leading article in this journal, reference was made to the use of laboratory examinations and tests by general practitioners. It was suggested that many of the more commonly used investigations should be made by the general practitioner in his everyday work. Several practitioners objected to the suggestion. Some held that work of this kind is not part and parcel of the routine of the examination by a general practitioner; others thought that sufficient time was not available. But times are changing. The race is not always won by the swift, but by the sure. Objectors now will not be so numerous. Medical practitioners are realizing more and more that the broad and smooth surfaced road of empiricism may make for swiftness, but that it leads quite often, if not to destruction, at least to futility.

The question as to how far each general practitioner should go in the carrying out of laboratory investigations (the term being used to cover the work usually understood as belonging to clinical pathology and biological chemistry) must be passed over for the moment. It must suffice to point out that, though general practitioners in the country will necessarily do for themselves much more of this type of work than practitioners in city or suburb, both will find that intensive effort will bring its reward in increased facility and wider understanding. Both will at times need the services of the consulting pathologist; as they discover the true value of laboratory aids, they will seek his advice more freely.

The final point remains and need merely be stated. Elaborate tests and microscopical examinations are worthless unless their true significance is understood. In order to help general practitioners in this matter it has been decided to publish a series of special articles on laboratory aids to diagnosis. To discuss the various aids to diagnosis is admittedly to approach them in an academic way. The general practitioner looks at his patient and considers laboratory aids in the light of the patient's symptoms; he does not consider different tests and what they signify. The new series of articles must be looked on as the logical sequence of the special articles on diagnosis. Had no articles on diagnosis appeared in this journal, aids to diagnosis would have been discussed from the more practical point of view. The first article appears in this issue, and subsequent contributions will be published at intervals of a fortnight. Later on, treatment will be dealt with, but diagnosis and aids to diagnosis must come first.

Current Comment.

CONSTITUTIONAL ANGIOHYPOTONIA.

ARTERIAL hypotension is a well known phenomenon in spinal anæsthesia and during chloroform narcosis. It may also occur in conditions of shock or collapse from hæmorrhage, profuse vomiting or diarrhœa and after venesection. It is seen in neurasthenia and general debility from overwork or underfeeding. It may be present in epileptic coma, in the acute infectious fevers (typhoid, diphtheria, scarlet fever, measles) also in acute rheumatism and the later stages of pneumonia. It is significantly present in pulmonary and renal tuberculosis. Even in the absence of physical signs in the lungs a persistent and otherwise unexplained low blood pressure should always raise the suspicion of pulmonary tuberculosis.

Constitutional angiohypotonia or idiopathic permanent arterial hypotension, designated also arterial hypotony or hyposphyxy, was first described by Andrea Ferrannini in 1903. Ferrannini describes the manifestations in detail.[1] These consist of a lack of tone in the arteries and veins without any corresponding lack in the heart, which may be overexcited. There is definite disturbance in the blood supply and nutrition of the organs, particularly the nervous system, liver and kidneys. There is sclerosis of the vessel walls, indicating the dystrophy and intoxication caused in their metabolism by the hypotony. There is general weakness often associated with hyperexcitability, attacks of vertigo, accentuated first mitral and second aortic sounds due to myocardial overexcitability, a tendency to cardiac displacement, acrocyanosis without general stasis, a tendency to visceroptosis, hæmorrhoids, oliguria, albuminuria and hæmaturia with renal casts. The condition might be confused with mitral stenosis or insufficiency. Ferrannini states that it originates from abnormal constitutional conditions due to intoxications or infections acting either *in utero* or during the first years of life and exercising a secondary effect on the organs regulating the development of the body generally and of the vascular tissue in particular, especially of the adrenals, thyreoid and pituitary glands. The abnormality of the function of the blood vessels may cause a vicious circle and derange the entire organism, commencing with the heart. Ferrannini regards the condition not as a mere mechanical trouble, but as a general and local biological derangement, and explains as angiohypotonic some syndromes described as congenital heart disease, hypertrophy of the heart, irritable heart and "effort heart." In 1903 he showed that patients suffering from constitutional angiohypotonia have functional insufficiency of the adrenal capsules and the sympathetic nerve supply—manifestations of endocrine disturbance. Observers recently have employed injection of the adrenal hormone in investigating the functional condition of the vessels. The term angiohypotonia indicates the disorder to be primarily of the vessel walls rather than of the heart, such disorder being a lack of tone. The terms "hypotension" and "arteriohypotension" do not indicate whether the heart or the vessels are responsible for the hypotonia. As there is undoubtedly a congenital or constitutional tendency some investigators include the term "constitutional" in the designation. H. Kahler (1928) demonstrated the underlying constitutional abnormality and lack of vascular tone in cases of variable blood pressure and arteriosclerosis in youth. In 1930 Ludwig Braun emphasized the importance of the general constitution in derangements of the circulation. In recognizing this constitutional picture difficulties arise, according to Ferrannini, from the clinician's habit of mind. Arterial hypotension is generally associated with myocardial insufficiency, and the heart is examined when a case is met with. Arteriosclerosis is not necessarily associated with angiospasm, and a patient with arteriosclerosis may have very low tension in his vessels, while his heart is in excellent condition. Another difficulty may arise from the supposition which accepts angiospasm as a cause of myocardial hypertrophy, but fails to realize that enlargement of the vessels also may necessitate increased effort on the part of the heart.

The general opinion is that Addison's disease involves the cortex rather than the medulla of the suprarenal capsules. Some authors hold the medulla to be of small importance. The extremely low blood pressure seen in Addison's disease is not readily explainable and does not occur in experi-

[1] *The Lancet*, May 23, 1931.

mental adrenal insufficiency. According to C. A. Mills a condition of functional hypoadrenalism associated with vascular hypotension occurs in countries where atmospheric heat and humidity go together. Adrenal tumours may be associated with continuous or intermittent hypertension. A. M. Shipley has reported paroxysmal hypertension in connexion with tumour of the suprarenal medulla. Vaquez and others have asserted that hyperplasia of the suprarenal medulla is a cause of vascular hypertension, but this has been controverted by others. The association of arterial hypotonia on the one hand and hypertension on the other with disorders of the suprarenal cortex and medulla remains to be clearly elucidated.

RENAL COMPLICATIONS OF PREGNANCY.

EACH of the toxæmias of pregnancy is accompanied by acidosis of a greater or less degree. In some instances there is an actual ketosis; but this is probably a secondary effect of the toxæmic condition and of the associated physiological disturbances. The degree of an acidosis may be expressed in terms of the carbon dioxide combining power of the blood plasma, the bicarbonate content of the blood plasma, or the carbon dioxide content of the alveolar air. The higher the degree of acidity, the lower is the figure expressing the value of any of these three. Osman and Close have shown that the chlorides of the plasma and the water in the body vary in quantity inversely as the plasma bicarbonate and directly with the acidosis. The existence of acidosis does not mean that there is necessarily some alteration in the hydrogen ion concentration.

Studies of the chemistry of the blood of pregnant women have been made by A. A. Osman and H. G. Close.[1] They do not suggest that the acidosis "is itself directly responsible for either the waterlogging or the renal complications of the toxæmias of pregnancy," but they believe that it is concerned with lowering the protein content of the blood plasma. They administer alkalis on the hypothesis that alkalis cause an increase in the osmotic pressure of the plasma proteins.

Osman had previously found that in the treatment of persons suffering from chronic nephritis and œdema, if sufficient quantities of alkali were administered, to raise the plasma bicarbonate content to normal, there resulted a diuresis that sufficed to rid the body of œdema and to effect a diminution in the albumin of the urine, or its actual disappearance. It was with this finding in mind that he and Close approached the problem of treatment presented by the albuminurias of pregnancy. In order thoroughly to test the value of alkalis in treatment, they allowed their patients a full mixed diet and compelled only those who were severely affected to remain in bed. The fluid intake was limited to three and a half to four pints in the twenty-four hours. Purging was forbidden. Liquid paraffin was sometimes administered, and enemata were occasionally necessary. No drugs were given, and colonic lavage was not employed. Treatment consisted in the administration of equal quantities of potassium citrate and sodium bicarbonate by mouth. Usually three grammes (fifty grains) of each were given, dissolved in a small quantity of water. As a commencing dose ten grammes (150 grains) per day were administered; this was increased each day by about six grammes (100 grains) until the desired effect was obtained. The quantity of urine passed each day was carefully measured; in practice it was found to be a good guide to the required dosage. It is notable that œdema often increased for a time in the early part of treatment; Osman and Close remark that the dosage of alkali must be increased at this stage. They point out, however, that it must not be increased beyond that required to produce diuresis, for further increase sometimes results in the recurrence of œdema.

The method was employed prophylactically and in the treatment of albuminuria of pregnancy and the preeclamptic state. Twelve patients suffering from albuminuria lost the greater part or the whole of their œdema as a result of the treatment. The percentage quantity of albumin in the urine was greatly decreased, mainly by dilution. Albumin in no instance actually disappeared from the urine, but in many instances it was reduced to an amount that would not be regarded as of serious import if no treatment was being carried out.

The administration of alkali to two of four preeclamptic patients was stopped at the commencement of labour. Both these patients became seized with convulsions *post partum*; one of them died. The other two patients received akali throughout and had no fits. In each instance the œdema was greatly diminished as the result of treatment, and the urinary albumin was decreased.

Osman and Close remark that chronic nephritis often causes impermeability of the kidneys to alkalis. Thus, when large quantities of alkali are administered in the treatment of this condition, frequent estimations of the plasma bicarbonate content have to be made on account of the danger of alkalosis. The kidneys of patients suffering from toxæmia of pregnancy, however, allow a free escape of alkali into the urine. There is no need, therefore, to make regular estimations of the plasma bicarbonate content of these patients, providing it can be ascertained that chronic nephritis is not present.

Pregnant women who had suffered from albuminuria during previous pregnancies, were given sufficient alkali to render alkaline the early morning specimen of urine. The dosage necessary was usually ten to twenty grammes a day. Of twenty-three patients only four suffered a recurrence of albuminuria.

These observations are of great importance and interest. Possibly Osman and Close would have obtained even better results if they had enforced some restrictions in diet and had insisted on absolute rest in bed for a period.

[1] *Proceedings of the Royal Society of Medicine*, May, 1931.

Abstracts from Current Medical Literature.

THERAPEUTICS.

Olive Oil.

M. CHIRAY (*La Presse Médicale*, November 1, 1930) discusses the uses of olive oil by mouth in therapeutics. Pure olive oil is difficult to obtain. It has been shown that olive oil is absorbed into the gall bladder and has a lubricant action, that it causes contraction of the gall bladder and expulsion of its contents. It relaxes the pylorus and permits reflux from the duodenum, and it inhibits gastric secretion. For these reasons, and because it is efficacious in relieving symptoms, olive oil is useful for gall stones, cholecystitis and in distended atonic conditions of the gall bladder. Two tablespoonfuls of olive oil flavoured with a few drops of oil of lemon should be given before a light breakfast on ten days of the month three or four times a year. Relief of symptoms is often noted and operation may be avoided. In hyperchlorhydria and peptic ulcer a dessertspoonful of olive oil four times a day before food is ingested has a definite effect in relieving symptoms.

Bacteriophage in Treatment.

P. HANDUROY (*La Presse Médicale*, February 4, 1931) discusses treatment by bacteriophage. It is essential that bacteriophage be prepared by a skilled bacteriologist, because the substance may be extremely dangerous if not properly made, secondary growth of organisms may occur in bacteriophage and these may give rise to disastrous reactions or infections. The bacteriophage to be used should be specific for the organism causing the infection, otherwise the treatment is useless. It should be prepared, if at all possible, from the actual causative organism in each case and should be tested against the organism *in vitro*, for if lysis of the germ does not occur *in vitro* it will not occur *in vivo*. Bacteriophage is valuable only in the treatment of staphylococcal, *Bacillus coli* and typhoid infections; two or three cubic centimetres should be injected subcutaneously every twenty-four hours for three or four doses. The injection should not be made near the site of infection, because of the pain produced. These injections cause little local reaction. Bacteriophage should never be injected into a vein, it may cause death. In staphylococcal infections the local application of one ampoule of bacteriophage on a compress is indicated, and in *Bacillus coli communis* infections injection into the bladder is well borne, but these local applications are not as a rule sufficient to produce a cure by themselves. In dysentery the substance is given by mouth. Staphylococcal infections should have regressed considerably or have disappeared in eight to ten days, otherwise the treatment should be considered to have failed. Apart from septicæmia (staphylococcal) in which good results are not obtained, 75% of staphylococcal infections are cured in six to eight days. Pure *Bacillus coli communis* infections respond well to treatment, provided that the particular causative organisms are isolated and the specific bacteriophage prepared. The results in typhoid fever are doubtful, and in streptococcal and pneumococcal infections no good results have yet been obtained.

Carbon Dioxide Treatment in Pneumonia.

RECENTLY several papers have appeared dealing with hyperventilation of the lungs induced by carbon dioxide in the presence of collapse of the air cells. In an editorial article of *The Canadian Medical Association Journal*, March, 1930, A. D. Blackader reports a paper dealing with 126 pneumonia patients treated by the inhalation of 5% carbon dioxide administered by means of inhalators usually employed in resuscitating asphyxiated patients. Of this group only nine patients died, while a number recovered as by crisis shortly after the inhalation. The best results are obtained in post-operative pneumonia, which is said to be associated with atelectasis. The few deaths which did occur in this series, were due to toxic effects and occurred among patients whose treatment had been commenced only when the attack was in an advanced stage.

Tuberculin Therapy.

MILES J. BREUER (*Annals of Internal Medicine*, May, 1931) states that tuberculin therapy must be based upon and be in accord with the facts of allergy and immunity as they have been learned from animal experimentation and pathological study and in accord with the principles that have been deduced therefrom. Allergy and immunity are discussed. The initial effect of the injection of tuberculin is the production of the allergic state. A series of small doses of tuberculin, properly graduated and timed, will desensitize the individual and diminish the allergic state, but there is some disagreement among workers in this field as to whether tuberculin will produce any immunity at all. Therefore, it can be used only to reduce allergic sensitization, but it must be remembered that the toxic symptoms and the inflammatory reactions found in tuberculosis are due to allergy. In selecting patients for tuberculin therapy, the distinction must be observed between symptoms of allergic origin and those of reflex origin. During the past year the author has studied the effect of tuberculin treatment on twenty-six selected patients. These patients had failed to improve appreciably with general measures, but none were suffering from severe or advanced tuberculosis. Treatment was commenced in each instance with 0·00075 milligramme of Mulford's old tuberculin and continued empirically, the size and frequency of the dose being determined by the patient's reactions and his increase in tolerance. The majority of the patients showed improvement in general condition, but only in five instances was there improvement in local physical findings. The author also analyses his results over a period of ten years and finds that of 181 patients treated by means of tuberculin therapy 41 (22%) showed very satisfactory results or arrest. In these cases allergic symptoms were a prominent feature.

Non-Specific Treatment of Asthma.

A. G. AULD (*The Lancet*, April 11, 1931), in discussing the non-specific treatment of asthma, states that there is proof that very small quantities of unchanged protein may be absorbed by the lacteals. In reviewing recent work on asthma, he mentions that Oriel and Barber have found that a proteose passed in the urine contains the antigen. The author describes his method of manufacture of serum peptone. Before treatment is commenced the scratch test should be made with peptone on the arm, concentrated peptone solution being used. The response to this test is a guide as to the amount of peptone to be used in treatment. The injection should be made intravenously, beginning with five minims of a 5% solution of peptone. After plain peptone has been tried without success, serum peptone should be used, a start being made with ten minims. The patient may require several courses of treatment. The author describes illustrative cases and concludes by stating that non-specific treatment must enter largely into that of asthma.

Thallium Acetate.

W. S. DUNCAN, E. H. CROSBY, S. S. GREENBAUM AND J. F. SCHAMBERG (*The Journal of the American Medical Association*, May 30, 1931) report three cases of poisoning due to the use of "Koremlu" cream nightly as a depilatory. "Koremlu" cream is an ointment containing thallium acetate. In two patients peripheral neuritis resulted after some months of this treatment, and in all three well marked alopecia of the scalp occurred, though the hair continued to grow vigorously on the parts to which the cream had been applied for depilatory effect, for example, lips, chin and axillæ. Thallium acetate is a poison with a similar effect to arsenic, but it is more potent. A 1% ointment used on any extensive area may cause toxic symptoms. It has been used to remove superfluous hair, and is used to produce epilation in diseases of the scalp in children; up to seven or eight years of age children withstand the action of thallium well, after those ages toxic effects are more often observed.

Potassium Thiocyanate.

D. AYMAN (*The Journal of the American Medical Association*, May 30, 1931) records some results of treatment of patients with hypertension

by means of potassium thiocyanate. In doses of 0·09 gramme (one and a half grains) thrice daily this drug did not usually cause any marked lowering of blood pressure, it did not relieve symptoms very satisfactorily, and it had certain definite unpleasant toxic effects, such as lassitude, weakness, mental lethargy, nausea and diarrhœa. These observations were made after prolonged treatment of a considerable number of patients in most of whom arteriolar degeneration was present in some degree. Larger doses of the drug were found to have pronounced toxic effects in some instances. The author suggests that potassium thiocyanate might be useful in patients in whom no arteriolar changes had occurred.

NEUROLOGY.

Parkinsonism Following Bisulphide of Carbon Poisoning.

M. FEDELE NEGRO (*Revue Neurologique*, November, 1930) writes to show that bisulphide of carbon, like the virus of encephalitis and certain organic poisons, has a particular affinity for the basal nuclei of the brain and is capable of inducing the Parkinsonian syndrome. He reports the history of a man of thirty years, a worker in an artificial silk factory and there exposed to the effects of carbon bisulphide, who over a period of two years gradually acquired general malaise, weakness, especially of the legs, tremor and rigidity of the arms, a fixed facies, and so ultimately presented an unmistakable picture of the Parkinsonian syndrome. Neither in his medical history nor on exhaustive clinical examination could anything other than exposure to carbon bisulphide be found to account for his condition. Reference is made to instances of Parkinsonism following poisoning with carbon monoxide and other chemicals in which definite lesions have been found in the *globus pallidus*; accordingly, although this particular patient survived, and confirmation of the supposed anatomical basis was not forthcoming, its existence is a reasonable supposition.

Otitic Hydrocephalus.

C. P. SYMONDS (*Brain*, April, 1931) is convinced that as a not uncommon complication of *otitis media* there may occur a state of increased intracranial pressure due to an excess of cerebrospinal fluid. He reports four examples and refers to many others in the literature of the subject. The condition has usually been described under the title of serous meningitis, but in showing neither clinical nor serological evidence of meningitis deserves another name. Hence the writer suggests "otitic hydrocephalus," which implies no active inflammatory process and may be applied to excess of fluid either within the ventricles or in the subarachnoid space. The ætiology and pathology of the condition are obscure, but this much is evident, that it is almost confined to children and adolescents and occurs as a complication of acute or chronic *otitis media*, with or without mastoiditis, labyrinthitis, lateral sinus thrombosis, extradural abscess or meningitis. Of the symptoms in the fully developed state intermittent severe headache and papillœdema are the most constant. A sixth nerve paralysis on the side of the discharging ear has been noted in a number of cases. Nausea and vomiting are inconstant features. The temperature and pulse rate are normal. The mental state, considering the degree of papillœdema, may be remarkably clear. The evolution of symptoms may be insidious or may follow an initial phase of fever and cervical rigidity suggesting meningitis. In the latter case the symptoms of meningitis subside as those of hydrocephalus progress. The cerebro-spinal fluid in the meningitic phase may show an excess of cells and protein, but in the developed state does not do so and is clear and under increased pressure. The illness tends towards perfect recovery, though this may be protracted. The rational treatment is drainage of the cerebro-spinal fluid by lumbar puncture, repeated if necessary. Surgical attention to the *otitis media* is an obvious need, but the existence of hydrocephalus is no indication in itself for intracranial exploration. The differential diagnosis from cerebral abscess may be difficult.

Deferred Effects of Head Injury.

PIGNÈDE AND ABELY (*Encéphale*, June, 1930), from observation of a number of cases of head injury, some arising out of the Great War, think they can describe a clinical picture which is typical. It must be understood that this picture is of long standing, even persisting years after the original injury. Intellectually there is defect of memory and attention, with extremely easy and early fatigue of all mental processes, but without impairment of judgement. Affectively, there is morbid irritability, emotional instability, impulsiveness and discontrol, sometimes leading to dipsomania. In regard to activity, there is lack of will power and a most decided diminution of professional capacity. And along with these psychic disturbances there is common complaint of headache, continuous or intermittent, and of giddy attacks very disturbing to the patient, but not actually epileptic. The writers consider that this train of symptoms might be based on prefrontal lesions, hæmorrhagic in kind.

Intracranial Aneurysms.

MAX SCHMIDT, of Copenhagen (*Brain*, January, 1931) thinks that intracranial aneurysm is perhaps more common than is generally supposed. At any rate he has collected twenty-three cases in the past fifteen years, and estimates that they are to be found once in every hundred autopsies. In his series no aneurysm smaller than a pea was included. Clinically it must be admitted that aneurysms recognized during life are to be regarded as rare. It is a new finding, however, that an aneurysm of the brain may give a characteristic radiographic picture. In the matter of localization the true, larger aneurysms are almost exclusively situated on the greater extracerebral arteries, most of all on basal arteries near or forming part of the circle of Willis. As to sex and age incidence, in the writer's series seventeen occurred in women and only six in men. The ages of these patients ranged from eleven to seventy-five years, but the majority were older than thirty years. The symptoms are variable. There may be increased intracranial pressure, indicated by headache and papillœdema; local and focal signs due to pressure upon cranial nerves, for example, degrees of blindness; or intermittent signs of leakage or rupture, shown by apoplectiform attacks and blood-stained cerebrospinal fluid. The only sign considered to be specific for intracranial aneurysm is a bruit heard on auscultation of the cranium. Ætiologically all aneurysms were originally ascribed to syphilis, but now opinion is very divided; in the writer's series only four were syphilitic. Other factors are congenital deformity, embolism and arteriosclerosis.

Disseminated Sclerosis in North Wales.

R. S. ALLISON (*Brain*, January, 1931) has inquired into the frequency and distribution of disseminated sclerosis in North Wales, as well as the occupations and possible causal factors in the case of affected persons. Some 65 cases were found in an area having a population of 492,049. This gave a rate of one per 8,600 inhabitants. Dark complexioned types predominated (a local feature), and thin and tall were more frequent than short and stout subjects. The distribution between urban and rural districts was about half and half, a proportion resembling that of the general population. Domestic and agricultural workers suffered dominantly in proportion to their dominance in the population. Almost all the chief occupations were represented, but there was no evidence that the rural incidence was greater than the urban, nor did any particular occupation entail special liability. No instance was found of two or more patients having lived in the same house, street or district. The only recurring feature was an unsatisfactory water supply, in many cases derived from a well liable to pollution, but it is open to question whether any importance is to be attached to this finding. It may be that this frequency is related to an impure water supply in itself rather than to any natural features of the district or peculiarity of occupations.

Special Articles on Aids to Diagnosis.

(Contributed by Request.)

I.

PERIMETRY AND SCOTOMETRY.

Definitions.

PERIMETRY has to do with the detection and measurement of gaps in or restriction of the outer limits of the visual fields. In scotometry blind areas are sought within the limits of the normal field, chiefly in the central and paracentral regions or in the neighbourhood of the "blind spot."

Perimetry.

The general practitioner of medicine, for whom this series of articles is chiefly designed, will be unable to measure such losses of field. This, however, need not deter him from their detection, as this can generally be done without apparatus; and in any case such measurement may be only a matter of interest or for purposes of record. The discovery of loss of field may often establish or clinch a doubtful diagnosis. It is my purpose later to indicate some of the commoner diseases in which a defect of field may be looked for.

A brief anatomical survey is here necessary. The visual unit consists of retinal cells, optic nerve fibres (partly decussating at the chiasma), the optic tract (traversing the internal capsule), the primary optic ganglia, the optic radiations and the occipital cortex.

A lesion at any of these points will cause a loss of field of a particular type. All interruptions on the far (brain) side of the chiasma will produce not only symmetrical, but homonymous defects. Whenever a visual field defect is confined to one eye, or if in both is not symmetrical, the lesion is in front of the chiasma, that is, is in the optic nerve or retina. A bitemporal peripheral loss of field can be due only to a lesion at the chiasma. This will be again referred to later. The above general rules, which are the natural corollary of the anatomical arrangements, do not apply to scotomata, but only to losses of the peripheral field.

Some Diseases Associated with Peripheral Field Defects.

The most striking and typical instance is the homonymous hemianopia associated with a vascular lesion in the internal capsule or cerebral cortex. Though always present in a hæmorrhage or embolism of the middle cerebral artery, it often escapes notice, as the patient is unconscious or is bedridden or soon dies. It is in thrombosis that it is often missed. After a very slight "stroke" the patient complains of dim vision in one eye: for that is how generally it strikes his imagination. And in my own practice on two or three occasions so gentle has been the onset of the vascular closure, and so minute the vessel involved, that the doctor who sent the patient to me with the complaint of dim vision in one eye has been unaware that such has occurred. It is only on demonstration that there is a complete (once, only a quadrantic) hemianopia that one can assert that the patient has had a slight "stroke," so slight, however, as sometimes only to involve the optic tract. It is a valuable warning for the patient's future.

Another easily discoverable field loss is the bitemporal defect associated with a lesion at the chiasma. It is caused by pressure on the fibres from the nasal half of each retina. This can only happen at one point, where they meet and cross at the chiasma. The lesion, though usually a pituitary tumour or cyst, is not necessarily such. It may be due to a gumma, to meningitis, to periostitis following a basal fracture, to distension of the third ventricle or of the sphenoidal sinus. If the condition is not relieved, optic atrophy, beginning at the inner side of the optic nerve, will supervene, accompanied by loss of sight.

Another gross type of field loss is met with in retinal detachment. When a patient complains of a sudden loss of sight, either after injury or not, a cursory examination will often elicit a definite loss of field in some one direction. Sometimes a detachment may be a late result of the growth of a chorioidal sarcoma. It is important therefore that every retinal detachment should be investigated. A large retinal hæmorrhage may produce a loss of field.

Pigmentary degeneration of the retina is accompanied by a progressive circular contraction of the field. Central vision may be good. Inquiry will elicit that night blindness is present.

In hysteria a general contraction of the field is often met with, and its limits vary at different times of examination. Visual impairment is also generally claimed.

In optic atrophy from any cause the field progressively contracts and the central vision fails.

In advanced chronic glaucoma the nasal quadrant of the field disappears first, accompanied and followed by a general narrowing until the field has become "tubular"; finally, complete blindness results. It should be noted, however, that long before the nasal field shows any defect, scotomata can be found within 20° of the fixation point, and connected with the blind spot. It is on the detection of these that we now depend for the early diagnosis of glaucoma, and not, as in earlier days, to the perimeter finding of a nasal field defect.

Methods of Perimetry.

I do not propose in this article to go into the refinements of perimetry, which are for the specialist. A full account of these will be found in the classical work of Traquair, of Edinburgh. It must be realized that the size of the field will vary directly with the illumination and with the size of the object exhibited. In consequence, fields taken by different observers, under possibly differing conditions, cannot fitly be compared. It must be remembered that white has a greater luminosity than blue, blue than red, and red than green. The vigilance of the examiner, the intelligence and attention of the patient and his nervous condition will all contribute to or militate against an accurate record. So also fatigue. The "fatigue field," a rapidly contracting one during examination, is a feature of neurotic conditions such as hysteria. The colour fields are reversed in some cases of brain tumour.

For those who use a perimeter I see no objection to the self-recording type, after the style of the McHardy. It is quick and sufficiently accurate, where an error of 5° is not of importance. The patient's fixing eye must be closely watched, and it must be explained that by "seeing" the moving object one means only that he should be conscious of its presence, and is expected only to see it with the "tail of his eye," so to speak.

But for the detection of the grosser forms of field defect a perimeter is unnecessary. The patient is placed seated with his back to the light, and covers one eye with his hand. He is directed to fix with his open eye the eye of the observer, who stands two feet away. The examiner then extends his arm so that the hand appears about midway between him and the patient, beyond the limit of the field in the direction in question. He will then "waggle" the fingers or move the hand about, and ask the patient if and when he first sees it. As the hand is equidistant from him and the patient, he knows whether the latter should see it or not. He repeats this for each quadrant and sector of the field. This is very rapid and quite sufficiently accurate for diagnostic purposes. A hemianopia is immediately manifest. In the case of a generally contracted field in optic atrophy from any cause the practitioner may be able from such an examination only to suspect some contraction of field as contrasted with his own, and will then refer the patient to a specialist for perimetric examination. A bitemporal hemianopia and the loss due to gross retinal lesions will be readily elicited in this way.

Scotometry.

The art of scotometry is essentially one for the expert. To map out blind areas within a radius of 25° from the fixation point requires a suitable scotometer (to which I shall refer later), patience and extreme accuracy; other-

wise it has little value. But before dwelling on this in greater detail, I propose to indicate a few common diseases of which a central or paracentral scotoma is the main diagnostic feature, and which may be easily detected by the general practitioner. And in these, as in certain diseases with peripheral defects, the detection of the scotoma is the essential thing, not its delimitation.

A scotoma is said to be positive when the patient is conscious of it, negative when he is not. It is absolute when a white test object is unperceived, relative when, though white is recognized (though perhaps dimly), less luminous colours, such as green and red, are missed. Such diminution in light perception is conveniently tested with colours. Every relative scotoma will become absolute if the exciting cause persists long enough. Negative scotomata do not become positive. For instance, a hemianopia due to a cortical lesion is negative. Scotomata caused by retinal disease are generally positive. Rapid diminution of colour perception is preeminently associated with progressive lesions of the optic nerve leading to blindness.

Anatomical.

The fibres subserving the macula have an important function, that of fine central vision. They are highly differentiated and apparently differ from the other nerve fibres in molecular chemical constitution, for they are peculiarly liable to toxic influences. In front of the chiasma these fibres lie in the centre of the nerve bundle like the red thread of an admiralty rope. Towards the globe they gradually approach the lateral aspect of the nerve until, at the disc itself, they lie in the outer segment, and thence spread fanwise to form an ellipse as far as and embracing the macula. The importance of this will be seen when we are considering toxic amblyopia.

Method of Detecting a Central Scotoma.

The examiner will stand two feet in front of the patient, who, seated with his back to the light, will cover one eye. The eye under examination, which it will have been ascertained has bad vision, will be made to fix a certain button on the examiner's coat. If he is wearing white, a black cloth can be pinned over it and two crossed pins inserted to be fixed approximately by the patient's eye. A white-knobbed hatpin is brought near the fixation object and the patient is asked if he is conscious of its presence. It is then brought over the button (the point of fixation), and, if there is an absolute scotoma, it will disappear. This will be repeated until the evidence is convincing. By using one's own body as a screen any roving of the patient's eye can be watched and corrected.

Regarding a relative scotoma, such as is associated, for instance, with tobacco amblyopia (in which case both eyes will be affected), a white object may still be perceived. But if a small piece of red wool or sealing wax on the end of a holder is held over an elliptical area extending from the fixation point to a few inches to the outer side, the colour will be lost or it will appear to be buff or brown. If, the eye still fixing the button, it is held above, below or to the inner (medial) side of this area, the red colour will be clearly seen. This area of impaired colour perception corresponds to the area of distribution of the macular fibres.

Some Clinical Manifestations of Central Scotoma.

Some diseases in which a central scotoma is the predominating feature and in which it may be readily detected, are as follows:

1. Acute retro-ocular neuritis. Acute retro-ocular neuritis may be due to exposure to cold, menstrual disorder rarely, dental or other focal sepsis often, and several other infections and poisons. The onset is rapid, but not sudden. Often there is pain on movement of the eye and an oscillating (paradoxical) pupil. Chronic varieties may be due to diabetes and disseminated sclerosis.

2. Macular hæmorrhage or inflammation, due to syphilis, sepsis, high myopia, arteriosclerosis and many other causes.

3. Eclipse or arc light burn. The history will generally be conclusive.

4. Tobacco amblyopia. Tobacco amblyopia is usually met with in men over fifty who are also free drinkers. In the absence of the alcoholic factor a debilitating illness, such as influenza, may be the determining agent. Insomnia is often present, and the patient complains that he has difficulty in reading, and finally in recognizing people at a little distance.

In the first three types the scotoma is absolute, in the last relative. Sector-shaped scotomata occur in partial optic atrophy, in occlusion of a retinal artery and in chronic glaucoma; isolated ones in retinal and chorioidal disease. These latter, however, can be detected only by the use of a scotometer and will hardly come within the purview of this paper. I will conclude it with some remarks about the scotometer, and especially about its application in the early diagnosis of chronic glaucoma.

The Scotometer.

The only scotometer worthy of consideration is one constructed on the principle of that introduced by Elliot. This combines Bjerrum's idea of a small object at a metre distance with Priestley Smith's suggestion of circular exploration. It is not self-recording. For scotometry I do not approve of the self-recording instruments. The pantograph attachment of most of them is distracting to the patient and does not make for accuracy of observation or record. And without extreme accuracy all measurements are valueless.

In chronic glaucoma, long before the classical nasal notch appears in the field, careful exploration of the central field will discover enlargement of and prolongations from the "blind spot," which creep snail-like towards the fixation point. These cannot be detected with the perimeter unless they are very gross. A scotometer is thus a very essential part of an oculist's equipment. For those who wish to pursue this aspect further, a full account is given by R. H. Elliot in the *Transactions of the Ophthalmological Society* for 1919. There is also a paper by the present writer in the *Transactions of the Australasian Medical Congress*, 1929. In the strict interpretation of the word, scotometry has its principal use in connexion with the problem of chronic glaucoma.

This paper is not intended to be comprehensive or to be a complete exposition of the subject. In the space at my disposal I have tried to divest the art of field examination of its esoteric character, so that it may be availed of to a greater extent by the general physician to the mutual advantage of himself and his patients.

E. TEMPLE SMITH,
F.R.C.S. (Edin.), D.O. (Oxon), F.R.A.C.S.,
Honorary Ophthalmic Surgeon to the Royal North Shore Hospital and the Royal Alexandra Hospital for Children, Sydney.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Melbourne Hospital on May 20, 1931. The meeting took the form of a series of clinical demonstrations. The first part of the report of this meeting was published in the issue of August 29, 1931.

Uretero-Vaginal Fistula.

DR. R. W. CHAMBERS's first patient was suffering from a double uretero-vaginal fistula with also separation of the urethra from its attachment to the bladder. The patient was aged fifty-four and first came under notice of a practitioner when she was suffering from cystitis in August, 1930. Later she developed urinary incontinence. On examination she was found to have the condition described. The curious feature about this case was the absence of

any definite ætiological factor in her history. Her last child was born twenty years ago. She had had five children, all without the help of a doctor. There was no history of any operative treatment since. An attempt was made in 1930 to repair the damage, but without success. About six weeks before the meeting a second attempt was made and this time with a greater degree of success. The bladder was exposed by an incision through the anterior vaginal wall and opened. It was just a small sac with only a potential cavity. The ends of the two ureters were isolated and freed. There was no urine passing through the right, but the left was operating well. Both were implanted into the sides of the bladder, a ureteric catheter being left in the ureter and being brought into the bladder and out from the bladder through an indwelling catheter, which was placed in position after the urethra had been sutured to the bladder. The bladder was then closed and vaginal mucous membrane sutured over it. The ureteric catheter was left in position for five days to allow of moderately good union before any urine was allowed into the bladder. The indwelling catheter was removed at the end of two weeks. There was good union and at the time of demonstration the urine came away by the urethra.

Dr. Chambers said that although the patient had not recovered complete control, her condition was considerably better. In discussing possible ætiological factors, he suggested that a calculus might have been the cause by ulcerating through the trigone of the bladder.

Compound Fracture of the Pelvis.

Dr. Chambers's second patient was a woman who had met with a motor accident whilst riding on the back of a motor cycle. She received an injury resulting in a compound fracture of the pelvis. This caused trauma to the anterior part of the vagina with separation of the urethra from the bladder and ripping the urethra along the whole length of its anterior surface, turning it into an open gutter. Some attempt was made to suture it when she was seen and treated immediately after the accident, but without any success. She was referred to the gynæcological department eight months after the accident. At this time there was good union of the pelvic bones, but she was left with troublesome incontinence of urine. She was operated on two months before the meeting and a new urethra was constructed by turning down flaps of mucous membrane and suturing round a self-retaining catheter as a scaffold. The result was very satisfactory. She could sleep all night without any leakage of urine and could hold it for one and a half to two hours in the day.

Kraurosis of the Vulva.

Dr. Chambers's third patient was a woman who had had marked kraurosis of the vulva with the attendant troublesome pruritus. She was aged sixty and had been suffering for many years. A vulvectomy was performed twelve months before with very satisfactory results. She now has no pruritus and looks and feels very well. The skin surrounding the vaginal orifice is soft and pliable.

Lupus Vulgaris.

DR. JOHN H. KELLY showed two children with *lupus vulgaris*. The lesions were healing rapidly with treatment by the Kromayer lamp. In each case the lesion was on the cheek and small rounded pits indicated the sites of preexisting apple jelly nodules. In one case a preauricular gland, in the other a cervical gland, had broken down and healed with a scar marking the site. Tubercle bacilli had been demonstrated in a discharge from one of these glands.

Dr. Kelly said that *lupus vulgaris* was extremely uncommon in Australia, but occasionally it was seen. These children had apparently been inoculated with tubercle bacilli in the skin of the cheek and spreading apple jelly nodules resulted. These patients were compared with the third patient.

Lupus Erythematosus.

Dr. Kelly's third patient, a woman, aged thirty-six, had acute disseminated *lupus erythematosus* which was improving with treatment with intravenous injections of gold sodium thiosulphate. The patient's face had been covered with large plaques of *lupus erythematosus* with the typical dirty grey adherent scale. The front of the chest had also been affected and the backs of the hands. The face was entirely clear and the hands and chest had improved very considerably. The erythematous plaques had lost their characteristic colour, their scale and their sharply demarcated borders. Dr. Kelly said that intravenous gold treatment would be continued until a complete cure resulted.

Permanent X Ray Epilation.

Dr. Kelly also showed a man, aged thirty-nine years, who for years had suffered from resistant "barber's rash." Permanent epilation with X rays was carried out three years previously. Dr. Kelly explained that temporary epilation had failed, but complete cure of the sycosis resulted from permanent epilation. The patient was shown to demonstrate the fact that permanent epilation could sometimes be achieved without the production of radio-dermatitis with its three cardinal features—atrophy, pigmentation, telangiectasis. In this particular patient only a minimal degree of atrophy could be demonstrated in the vulnerable area over the *risorius* muscle when the patient smiled. He was quite hairless over all the beard area.

Tinea Capitis et Corporis.

Dr. Kelly's next patient was a child with ringworm lesions of the scalp due to the microsporon; ringworm lesions were also present on the body. This child was compared with the next patient.

Tricophytide.

Dr. Kelly also showed a child who was suffering from ringworm of the scalp of the large spore variety. Some of the lesions tended to form kerion. There was a generalized eruption on the trunk and extremities which, as Dr. Kelly explained, sometimes accompanied large spore ringworm infection of the head. He said that it was believed to be toxic in origin and was known as tricophytide.

Gumma of the Upper Lip.

Dr. Kelly showed a woman, aged forty-four, who had a large healing ulcer, the size of a florin, on the left upper lip. It had been present for two months. The lesion had been crusted and still showed considerable surrounding inflammation and some œdema. The blood gave a strongly positive response to the Wassermann test and the ulcer was commencing to heal with antisyphilitic treatment. This condition was compared with that of the next patient.

Rodent Ulcer.

Dr. Kelly's next patient was a man, aged forty-eight years, who suffered from a superficial spreading rodent ulcer of the left upper lip, showing a tendency to central scarring with a typical raised pearly border. This lesion had been slowly spreading for ten years and the slowness of its progress contrasted strongly with the rapidly destructive lesion of tertiary syphilis seen in the previous patient. Radium treatment was to be applied in this case.

Multiple Rodent Ulcer with von Recklinghausen's Disease.

Dr. Kelly showed a woman, aged sixty-two years, with numerous rodent ulcers on the face; she also had the characteristic doughy tumours of neurofibromatosis on the body and the extremities. There was no pigmentation, but there was considerable mental hebetude.

Verrucose Pyoderma.

Dr. Kelly's next patient was a man, aged fifty-eight years, who presented an inflamed purulent lesion on the left side of the neck, tending to heal with a honeycombed or warty type of scar. He had old scars on both arms, where similar pyogenic lesions had healed with white patches of scarring and interlacing beaded tags of skin. Dr. Kelly said that this condition had been described by

Dr. George R. Hamilton and Dr. E. B. Jones in THE MEDICAL JOURNAL OF AUSTRALIA of April 18, 1931, at page 476.

Tertiary Syphilis.

Dr. Kelly showed two patients with tertiary lesions of syphilis. One had a solitary large semilunar nodular area under the chin, and the other the most florid variety of generalized psoriasiform syphilis. The latter exhibited a large gumma of the right lower lip and large numbers of serpiginous, annular and crescentic lesions with infiltrated scaly borders. Some of the areas demonstrated varying degrees of atrophy and pigmentation. No genital scar of a primary lesion could be detected. The blood gave a strongly positive response to the Wassermann test.

Severely Infected Scabies.

Dr. Kelly showed a child, aged five months, who presented large, inflamed, pus-infected, crusted areas on arms, legs and body. The characteristic papules of scabies were to be seen, however, on the palms and soles and in the folds about the ankles and axillæ. Dr. Kelly said that the secondary infection would be cleared up by the use of weak lysol and white precipitate ointment, half strength sulphur ointment being applied to the non-infected areas and its use gradually extended as improvement proceeded.

Pityriasis Rosea.

Dr. Kelly showed a woman, aged forty-six, who was suffering from pernicious anæmia and who developed a rash while undergoing liver feeding. This was confined almost entirely to the right half of the trunk. The individual patches showed the typical ragged collarette of scale and a shade of erythema somewhat paler than the characteristic pink of *pityriasis rosea*. Dr. Kelly explained that *pityriasis rosea* was differentiated from seborrhœa and other conditions by the frequent occurrence of a herald patch like a ringworm, which preceded the general efflorescence. The rash is usually limited to the trunk and proximal parts of the extremities.

Psychogenic Dermatitis.

Dr. Kelly's last patient was a young male, aged twenty-two, who showed massive excoriations of both lower extremities with some peeling of his face due to friction. Careful inquiry revealed that for years he had been unable to go to sleep without first tearing at his legs until they were raw. He experienced no pain, and having achieved widespread epithelial denudation, he felt a sense of relief and satisfaction. He remained sleepless and restless if he did not carry out this programme of excoriation. He was facile and proud of the fact that he had what he described as an "incurable eczema." The psychological problem was discussed.

Fracture of the Skull.

DR. A. E. COATES showed a patient who suffered from a fractured skull with subdural hæmorrhage. The patient was a male, aged forty-one years, who sustained a severe skull injury in a motor accident three weeks previously. On admission he showed signs of cerebral irritation and had an extensor plantar reflex on the left side. There was a large hæmatoma on the right side of the skull and the bone in the right temporal fossa was palpable in the centre of the hæmatoma and appeared to be depressed. The usual flap of skin and muscle was turned down and the skull trephined in the temporal fossa. The whole of the squama of the temporal and the great wing of the sphenoid bone were quite loose, the fracture having extended to the base of the skull. The dura, which was tense, blue and non-pulsating, was incised and the brain exposed. The cerebral cortex was black with a subarachnoid hæmorrhage and herniated through the 5·0 by 7·5 centimetre (two by three inch) hole in the skull. The flap was replaced and sutured, with drainage at each lower angle. Recovery was complete within a few days and there were no residual signs of cerebral impairment. Dr. Coates said that the case illustrated the power of recovery of a tense, swollen black brain when the lesion was local.

Genu Recurvatum.

Dr. Coates's second patient was a boy of eighteen, who four years before attended the hospital for pain in the left knee, with a gradually developing *genu recurvatum*. X ray examination at that time revealed a rarefaction of the epiphysis of the tibial tuberosity which was formed as a separate centre. Despite splint treatment to correct the deformity, it was progressive, and X ray examinations at intervals in the past four years showed a steady destruction of the tibial tuberosity and also a bending of the tibia at that level, the result being an alteration in the alignment of the upper surface of the tibia. This oblique surface allowed the femur to slip forwards and aggravated the *genu recurvatum*. Four months before, the epiphyses about the knee being well ossified, an osteotomy was performed, a wedge being removed from the posterior aspect of the tibia at the level of the tibial tuberosity, and the upper articular surface of the tibia was brought into a horizontal position. The fibula was fractured also to permit correction. The fractured bone was retained in correct alignment by the application of beef bone plates and pegs and putting up the limb in plaster. Union was firm in three months and the result to date is good. Some relaxation of the posterior ligaments of the knee rendered the wearing of a flexed caliper splint desirable for a time.

Abnormality of the Tibia.

Another case illustrating the occasional occurrence of trouble in the region of the knee was also shown. A girl, aged fifteen years, with a rudimentary patella on the left side, sustained a slight injury to the knee. X ray examination revealed the absence of any bony tuberosity of the tibia and also of a portion of the anterior part of the articular surface of the tibia, so that the menisci could have little bony attachment.

Periarterial Sympathectomy in Raynaud's Disease.

Dr. Coates's next patient demonstrated the effect of periarterial sympathectomy in Raynaud's disease. A woman, of seventy years, with a failing heart, subject to chilblains all her life, developed painful, cold, white fingers seven weeks before. The pallor was replaced by cyanosis at times and the pain was intense. Gangrene of the tips of all the fingers occurred. She could not feed herself or sleep for pain. Covering the hand with woollen gloves did no good. Hot and cold baths and other exercises designed to improve the circulation were ineffective. The systolic blood pressure was 115 and the diastolic pressure 84 millimetres of mercury. The arteries were slightly thickened, but easily palpable, and there was no evidence of organic occlusion of either radial or ulnar artery on each hand. Three weeks before the meeting, alcohol injection of the sheath of the left brachial artery and stripping of the sheath of the right brachial artery were performed under local anæsthesia. Thermophile readings at operation showed a rise of temperature of the finger tips of 6° C. within a quarter of an hour of treating the artery. The pain disappeared, stiffness passed off, gangrenous patches had separated and, at the time of showing, the right hand, originally the worse, was quite healed and warm, while the left showed the same temperature recovery, but the gangrene patches were not yet completely separated. A temperature chart of the fingers showed a difference between room temperature and that of the fingers of 6° C. for two weeks, after which a steady approximation appeared to be taking place between room and finger temperature. The patient was free from pain and had full use of both hands.

A Foreign Body in the Duodenum.

A surgical curiosity in the form of a male, aged thirty-six years, who swallowed a "Valet" razor blade and clasp, was also shown. The blade and clasp were recovered from the third part of the duodenum, where they had been impacted between the superior mesenteric artery and the abdominal aorta for four days. Recovery was uneventful.

Genito-Urinary Tuberculosis.

DR. HAROLD MOORE showed a series of patients and pyelograms illustrating genito-urinary tuberculosis. The following were amongst the more interesting.

A single woman, aged forty-nine years, was sent from a medical clinic for a pyelogram because of a shadow shown in the region of the upper pole of the kidney in a plain skiagram of the urinary tract and thought to be a healed tuberculous lesion.

Her chief trouble was a pain in the right hypochondrium; she did not complain of urinary symptoms, though, on being questioned, she admitted some increase in frequency. A right pyelogram showed the shadow to be in the kidney and cutting off the upper calyx.

The urine from the right kidney was clear; but that from the left contained numerous tubercle bacilli. In other words, there was evidence of a healed tuberculous lesion on the right side and an active lesion on the left.

She was treated by injections of tuberculin and at the time of demonstration was keeping quite reasonably comfortable and well, although there were still tubercle bacilli in the urine.

A married woman, aged twenty-seven years, when first seen three years ago, had a left nephrectomy for active advanced tuberculosis. She attended very irregularly after the operation, and then about ten months later came up stating that she was pregnant. At this time she was passing deeply blood-stained urine with a great deal of pus. The pregnancy was terminated, and she attended fairly regularly for a few months, getting injections of tuberculin. She still attended at the time of reporting, though somewhat irregularly. She has only slight frequency, with no blood in the urine. In August, 1930, her urine was examined for tubercle bacilli, when none was found in a twenty-four hour specimen; but a guinea-pig test gave a positive result.

Dr. Moore said that the interest in her case was the recovery made by her solitary kidney after the termination of the pregnancy.

A widow, aged forty-seven years, suffered from hæmaturia, pain and strangury for four years. X ray examination revealed no abnormality. The urine contained pus, but no tubercle bacilli were found. Cystoscopy and pyelography revealed a very small bladder with a left pyo-nephrosis and pyo-ureter, but with good function on the right side.

She was admitted and a left nephrectomy and ureterectomy performed. Section of the kidney proved the condition to be tuberculous. She was relieved of her pain; but the frequency due to the condition of her bladder persisted.

A married man, of thirty-two years, illustrated the importance of investigating and keeping in touch with a symptomless hæmaturia. He came up in December, 1928, complaining of hæmaturia on three occasions during the preceding three months. Examination then revealed no abnormality and he was instructed to report if he had trouble of any sort; but did not come up till nine months later. At this time he had pain in the left side of the groin for some weeks, the last attack four days before coming to hospital. There had been no further bleeding and a skiagram revealed faint shadows on the left side. Cystoscopy then demonstrated a left side lesion with good function on the right side. He was sent indoors for a nephrectomy. Actually he had a double ureter, with one involved by the tuberculous process and the other clear. Section proved the kidney to be tuberculous. He did not do well after the operation. Although there had been no evidence of a lesion in his vesicles, he developed a right epididymitis and his lumbar wound broke down. He was given tuberculin in the ward, but had an anaphylactic reaction, so that he received only general treatment since his operation, but gradually improved. His urine at the time of reporting was macroscopically clear. Nearly twelve months ago, nine months after his operation, examination tion of a twenty-four hour specimen of his urine revealed no abnormality; but a positive finding following injection of urine into a guinea-pig.

A married man, aged thirty-five years, illustrated how some individuals apparently tolerate a widespread infection with tuberculosis. He was seen first in a medical ward on June 16, 1930, because he had developed retention. His history was that he had an injury to his right testicle nineteen years ago. Nine years ago the same testicle enlarged, broke down and discharged for three months. He wore a suspensory bandage and was well till February, 1930, when he began to suffer from frequency and pain in the penis. The frequency increased and he then began to pass blood and pus in the urine, the amount of blood increasing steadily. When in the ward, he had been passing clots and developed clot retention. At that time he had a narrow urethra, though a number 6 English gum elastic catheter was passed with difficulty and tied in for twenty-four hours. His urethra was then dilated and he was discharged to the out-patient department. When first seen, he had obvious involvement of both vesicles, prostate and right epididymis and cord. His urine contained tubercle bacilli. The kidney functional tests gave good results. No cystoscopic examination was done because of the condition of his prostate and vesicles. He was treated on injections of tuberculin, an initial dose $^1/_{250000}$ milligramme in the ward to final dose of $^1/_{1000}$ milligramme being used. Six months after his discharge from the ward his right epididymis flared up. Absolute rest was ordered, but a sinus was formed which healed within two months and remained healed. At the time of the meeting he had no symptoms.

Renal Calculi.

DR. J. T. TAIT showed a patient who had had bilateral renal calculi. A stone had been removed from one branch of a bifid renal pelvis on the left side and six months later a nephrectomy for calculous pyonephrosis had been done on the opposite side. The patient was very well and had no recurrence of symptoms after eighteen months.

Skiagrams.

DR. HOWARD F. PRAAGST showed a series of X ray films illustrating the use of urography, both by the intravenous and retrograde methods, in various pathological conditions of the urinary tract. The conditions demonstrated included hydronephroses of various types and ætiology, polycystic kidneys, renal malignant disease, and several unusual congenital anomalies.

He also showed films illustrating the different stages in development of diverticulosis of the colon; the use of "Lipiodol" in lung lesions, including malignant disease and apical bronchiectasis; the use of "Lipiodol" both by ascending and descending technique in spinal conditions, including neoplasms, hydatid and tuberculous disease; and a series of bone malignant disease, primary and metastatic.

Thyreoid Disease.

DR. G. A. PENNINGTON showed several patients who were suffering from disorder of the thyreoid gland. The details will be reported in a subsequent issue.

Dental Conditions.

MR. G. FINLAY, DR. J. M. LEWIS, DR. A. AMIES, DR. W. E. FLEMING and MR. K. F. SKUES demonstrated dental conditions and apparatus. These included patients with fracture of the skull and mandible, and malignant growth of the palate treated by radium with upper plates; dental cysts; an impacted lower canine tooth; celloidine sections illustrating pyorrhœa.

MEDICO-POLITICAL.

AT the meeting of the Council of the Victorian Branch of the British Medical Association it was announced that the British Medical Insurance Company, of Victoria, had made a grant of £250 to the library of the Victorian Branch.

The British Medical Agency has also provided the sum of £400 to enable the Medical Society of Victoria to pay interest on debentures outstanding in connexion with the building and furnishing of the Medical Society's Hall.

It is hoped by the Council that this evidence of the usefulness of these two bodies will stimulate the members of the Branch to take a practical interest in their activities.

NOMINATIONS AND ELECTIONS.

THE undermentioned has been nominated for election as a member of the New South Wales Branch of the British Medical Association:

Kee, Harry, M.B., B.S., 1928 (Univ. Sydney), 64, Arden Street, Clovelly.

The undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Cronin, Mary Josephine, M.B., B.S., 1927 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Hoskins, Albert Edward Roy, M.B., Ch.M., 1925 (Univ. Sydney), 531, New Canterbury Road, Dulwich Hill.

Irwin, Robert Samuel, M.B., 1925 (Univ. Sydney), Royal Hospital for Women, Paddington.

The undermentioned has been elected a member of the Victorian Branch of the British Medical Association:

Blair, Robert Smith, M.B., B.S., 1931 (Univ. Melbourne), Talbot.

Obituary.

EDWARD LODEWYCK CROWTHER.

DR. EDWARD LODEWYCK CROWTHER, whose death was recorded in a recent issue of this journal, took a prominent part for many years in the medical life of Tasmania. For the last few years he lived practically in retirement on his farm at Oyster Cove and news of his death was received with regret by many, particularly among the older members of the community. His father and his grandfather before him bore honoured names in the island (both were medical practitioners) and his son, at present Vice-President of the Tasmanian Branch of the British Medical Association, is carrying on the family tradition. Visitors to Hobart cannot fail to be impressed by the statue of the father of Edward Lodewyck Crowther, W. L. Crowther, sometime Premier of the State.

Edward Lodewyck Crowther was born in Hobart in 1843. He was sent to Hutchin's School, Hobart. He began the study of medicine with his father at the Hobart General Hospital, and ultimately went to Guy's Hospital, London. He did some work at Moorefields Hospital and the Birmingham Lying-in Hospital, and then proceeded to Aberdeen, where he took his degrees and gained honours in medicine. He was admitted as Member of the Royal College of Surgeons of England, Licentiate of the Society of Apothecaries and Licentiate of the Royal College of Physicians of Edinburgh in 1866. In 1867 he became Bachelor of Medicine and Master of Surgery of the University of Aberdeen, and was admitted to the degree of Doctor of Medicine in 1871. After practising in Lincolnshire for six years he returned to Hobart in 1875. He carried on his grandfather's practice, which had been founded in 1825. He was for many years connected with the Hobart General Hospital as surgeon. He was a member of the Court of Medical Examiners from 1885 to 1901 and President of the Medical Council of Tasmania from 1901 until his death.

In his earlier years Crowther was interested in defence matters. In 1878 he initiated the movement that resulted in the formation of the Southern Tasmanian Volunteer Artillery; he ultimately became its commanding officer. During the Great War, when over seventy years of age, he trained a voluntary aid detachment.

As his father was Premier of the State, it was natural that Crowther should be interested in politics. He was elected to Parliament as representative of the Queenborough electorate in 1878, and after a redistribution of seats represented Kingborough. In 1909 he decided not to offer himself for reelection. He was associated with the University of Tasmania at its foundation and was a member of its council until a year or two before he left Hobart. From this short account of Crowther's career it will be seen that he was of service to his day and generation. His name will be remembered for his achievements in his professional and public life. He endeared himself to many who will feel a personal loss at his passing.

FREDERICK GEORGE FAILES.

WE regret to announce the death of Dr. Frederick George Failes, which occurred at Deewhy, New South Wales, on August 26, 1931.

Correspondence.

PROFESSIONAL ADVERTISEMENT.

SIR: To summarize:

1. I wrote to you (May 16, 1931) suggesting that certain improvements could well be made in obtaining a true opinion of the members of the British Medical Association. I objected in particular to the calling of a "general meeting" of the Association in the full knowledge that only a small proportion of members could attend. I suggested a ballot on important questions.
2. Dr. Hugh Hunter wrote to you (July 4, 1931) pointing out that: "Time and time again the response has proved the ballot method to be hopeless."
3. I wrote (July 25, 1931) asking Dr. Hugh Hunter to substantiate his statement by informing me how many such ballots have been taken and what results they have achieved.
4. Dr. Hugh Hunter wrote (August 15, 1931) confessing that no ballots have been taken, but that a local association has tried the method.

Is there any need for further comment? Except, perhaps, to express the hope that the remainder of the opinions of Dr. Hunter are based on more convincing evidence.

Yours, etc.,

KEITH BARRY.

Grose Street,
Leura, New South Wales,
August 17, 1931.

INTESTINAL OBSTRUCTION.

SIR: In a recent article in your journal I pointed out that when dealing with cases of recurrent abdominal colic there had to be considered in the differential diagnosis a peculiar grade of intestinal obstruction.

This type of obstruction differed from the type of acute obstruction usually seen, inasmuch as the attacks of colic were widely separated, vomiting did not commence till late, and, most important of all, that the patient's general condition remained excellent until matters were well advanced. Under the best of circumstances it is often impossible to diagnose the condition until from twenty-four to thirty-six hours from the onset. Usually it is even longer delayed. With a view to making the diagnosis at a much earlier stage, I suggested that in any case where a patient had had two attacks of abdominal colic separated by a few hours that two procedures should be carried out. The first was an X ray of the renal tract for stone and the second was the giving of a barium meal.

The patient was to be screened six hours and then eight hours after the meal, and by this means it was hoped to make the diagnosis earlier than would be possible by ordinary clinical means.

In a private communication Mr. J. Colvin Storey, of Sydney, questions the wisdom of giving a barium meal to a patient who is suspected of having intestinal obstruction. He points out that if there is obstruction, the bowel will be very much handicapped if it has to deal with a heavy

meal such as is given for X ray purposes. He even knows of a case where a barium meal caused an obstruction. I must confess that this aspect of the matter had not occurred to me, and the criticism seems a very sound one.

In a recent number of *The British Medical Journal* (June 27, 1931), Milligan and Simons publish an article on the use of skiagrams in intestinal obstruction. In their cases, however, the diagnosis of intestinal obstruction had already been made, and they were concerned mainly with the site of the obstruction.

In the cases I reported the question was one of differential diagnosis of colic of unknown origin.

When the paper was read, Dr. W. P. Holman, Radiologist to the Launceston General Hospital, suggested ordinary skiagrams as a means of diagnosis in these cases. This certainly seems well worth trying.

The routine radiogram for renal stone could be used for this purpose.

Certainly a radiogram taken so soon as just after the second attack of colic would be unlikely to show distension. If there is no objection on the score of expense, however, repeated radiograms could be taken at intervals of a few hours and might enable a diagnosis to be made sooner than would be possible by ordinary clinical means.

Yours, etc.,

C. CRAIG,

Surgeon-Superintendent, Public Hospital, Launceston.

Launceston,
August 18, 1931.

Diary for the Month.

SEPT. 8.—New South Wales Branch, B.M.A.: Ethics Committee.
SEPT. 10.—New South Wales Branch, B.M.A.: Clinical Meeting.
SEPT. 15.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
SEPT. 22.—New South Wales Branch, B.M.A.: Medical Politics Committee.
SEPT. 23.—Victorian Branch, B.M.A.: Council.
SEPT. 24.—South Australian Branch, B.M.A.: Branch.
SEPT. 24.—New South Wales Branch, B.M.A.: Branch.
SEPT. 25.—Queensland Branch, B.M.A.: Council.

Medical Appointments.

Dr. H. G. Howell (B.M.A.) has been appointed Government Medical Officer at Quirindi, New South Wales.

* * *

Dr. H. Barnett (B.M.A.) has been appointed Government Medical Officer at Branxton, New South Wales.

* * *

Dr. R. S. Le Cappelaine-Taylor (B.M.A.) has been appointed Government Medical Officer at Coolah, New South Wales.

* * *

Dr. J. J. Donnellan has been appointed Government Medical Officer at Dora Creek, New South Wales.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xvi.

ANTI-POLIOMYELITIS CAMPAIGN IN VICTORIA: Medical Officer.
LAUNCESTON PUBLIC HOSPITAL, TASMANIA: Resident Medical Officer (male).
LEWISHAM HOSPITAL, SYDNEY, NEW SOUTH WALES: Senior Physician.
NEW SOUTH WALES MASONIC HOSPITAL, SYDNEY: Honorary Radiologists, Honorary Pathologists.
PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.
SYDNEY HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Aural Surgeon, Honorary Relieving Assistant Aural Surgeon.
THE BRISBANE AND SOUTH COAST HOSPITALS BOARD, QUEENSLAND: Honorary Clinical Assistants.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company, Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members desiring to accept appointment in ANY COUNTRY HOSPITAL, are advised to submit a copy of their agreement to the Council before signing, in their own interests. Brisbane Associated Friendly Societies' Medical Institute. Mount Isa Mines. Toowoomba Associated Friendly Societies' Medical Institute.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

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